commodore

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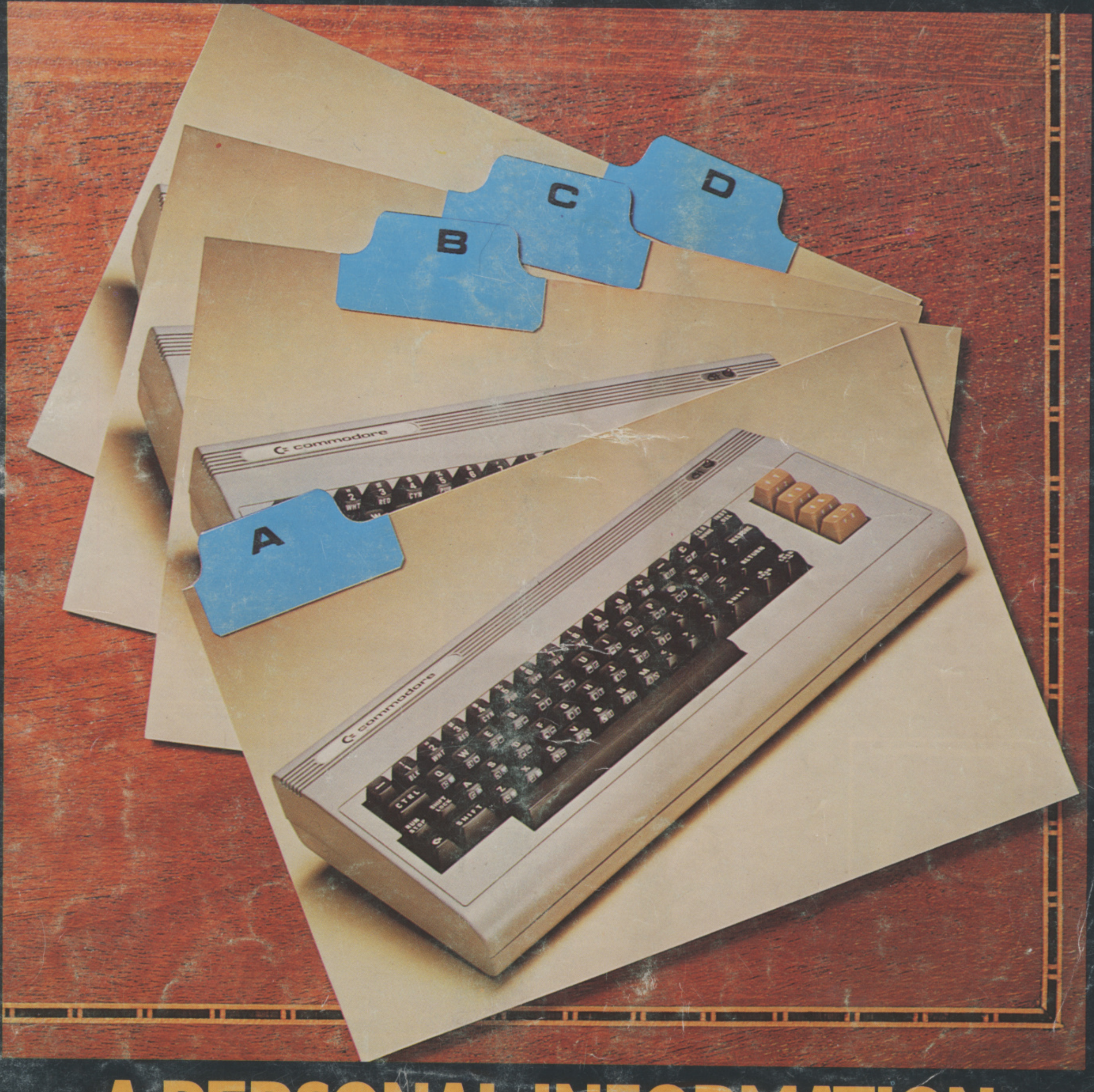

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AUG 1983

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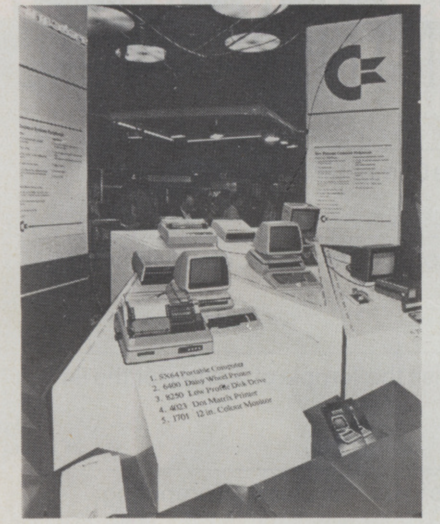
NEWS


1. SX64 Portable Computer
2. 6400 Daisy Wheel Printer
3. 8250 Low Profile Disk Drive
4. 4023 Dot Matrix Printer
5. 1701 12 in. Colour Monitor

Looking back at the show . . .

Held at the Cunard International Hotel in London on June 9, 10 and 11 the 4th International Commodore Computer Show surpassed everyone's hopes. Split into two floors with numerous places of refreshment and sustenance, 18,000 square feet of space was occupied by over 70 exhibitors – many of whom saw the show as an ideal vehicle from which to launch their new products – and over 16,000 visitors, which is more than double the attendance of last year even though the first day did coincide with the General Election. In fact 27 companies launched new products.

It would be fair to say, that the section that attracted the largest crowd was the bottom floor which was dedicated solely to games and education for the VIC and 64. Commodore themselves launched 17 new products and allowed the public to have a look at an amazingly, addictive game called Soccer, which is due for release in September. On the Commodore education stand, was the new speech module for the 64 which has a vocabulary of 235 words spoken at either a fast, medium or slow speed. Along with this, the module can also support cartridges of up to 128K and can be programmed direct from Basic or Assembler and mixed with music and graphics. A company called EDATA displayed, what they called talking book programs, which use a small add-on box that enables the 64 to talk to the user.

The cartridges have colour graphics, animation, sound effects and speech and at the moment 10 of these cartridges are available.

Alphatronic had a new series of light pens and dust covers, Automation Facilities came up with a new cleaning kit and companies like Audiogenic and Rabbit had mountains of games. Moving onto the business side of things, there was everything from interfaces to hard disc drives, word processors to complete data base systems, and of course, the new Commodore machines, which included the SX64 portable computer to be made available in this country later on in the year, the 6400P daisy wheel printer and the 4023 and 1526 printers, along with a mouse, track ball and graphics pad. There was also the four colour printer/plotter, the 8250SK disk drive and the 1701 colour monitor.

CP/M was not left out either. A 64 ran it with a Z80 cartridge demonstrating the Nevada Cobol language and the 730BX – 256K RAM machine with 8088 and 6509 processors – ran CP/M-86.

Amongst the many Commodore VIP guests was the Commodore boss Jack Tramiel and one of the things he must have discussed was the recent formation of a Commodore software division which is presided over by Mr Sigmund Hartman and, according to Mr Tramiel, his first main responsibility will be to establish "a broader nucleus of small business, educational, home and recreational software for Commodore microcomputers."

Commodore are already talking about next year's show and provisional bookings are already being taken. It is hoped that the Cunard Hotel will be the venue again and that the dates of the show will be between June 4 and 11.

Quicksilva Predicts a Golden Future

Nick Lambert, the founder member of Quicksilva who have recently published a new set of games for the VIC-20, is predicting a turnover of between £10 million and £50 million – good going considering that the company was founded only two years ago with the help of a £200.00 overdraft.

W.H. Smith, Boots, Menzies and Virgin have all started placing sizeable orders and the company is hoping to launch its products in America, although whether companies will be licensed to make Quicksilva's products remains to be seen. It could be that the company plans to attack the market through distributors only.

Whatever course of action they take, they are not planning to rest on their laurels. They recognise the need for increased efficiency and inventiveness. Nick and John Hollis will partially relinquish their association with the company for a while – although they will still retain their shares – so that they can be creative in other computer projects.

Because everything is in such an early stage, Nick Lambert was rather reluctant to divulge their plans although the VIC is high on their list of priorities. Their stepping down means that the board of directors is going to be changed. The new board will be : Mark Eyles, Caroline Hayon and Rod Cousins.

Wilkes Award

The British Computer Society has named Dr. Paul Rautenbach as the winner of the Wilkes Award which has been instituted by the British Computer Society to mark the retirement of Professor Wilkes as Professor of Computer Technology at the University of Cambridge. Rautenbach received the award, a medal, for presenting a paper entitled 'Combining data flow and control flow computing' which was published in The Computer Journal. The judges believe that the winning entry will affect how computers will be designed in the future. The British Computer Society have also decided which schools are eligible for prizes in the Jubilee Schools Project Competition. In total, there are 27 schools and colleges from all over the country who have won prizes ranging from complete computer systems to cash vouchers. Although the major prize winner was King James 1st School, Bishop Auckland who produced a staff supervision program, Commodore Business Machines awarded two prizes. One was a 64 which went to the Meldrum Primary School in West Lothian for a reading and spelling system and the other was an 8032 to Our Lady of Lourdes High School, Ballymoney, Northern Ireland. Commodore decided that this entry had the most commercial value because the school has produced a system of herd book files for the farming community. All of the entries for the school competition were judged by Fellows of the British Computer Society.

NEWS

Plans for a Super Computer/Video Show at the NEC

Looking back at the computer sales for last year's Christmas period and on the number of surveys which have been conducted since then, Clapp and Poliak have decided to stage their first consumer computer exhibition with a show called 'Brainwave '83'.

The show, which is to be held at the National Exhibition Centre in Birmingham on November 4, 5 and 6 will, according to the organisers, be the first home computing, video and electronics family show where members of the public can try out and buy any of the electronic wizardry available. Commodore have been approached as potential exhibitors but whether they will put anything on show remains to be seen.

This sounds like an opportunity which is not to be missed since the organisers expect to attract a crowd of around 50,000. Previously purely trade exhibition organisers, Clapp and Poliak have moved into this market because it is highly competitive; they see the consumer market as a major growth area. Mike Rusbridge, the exhibition director, says that 'the show will be a family wonderland, bursting with the largest range of home computers, video games, electronic kits and accessories that has ever been assembled'.

One of the industrial surveys that the show is based upon concluded that 25% of all home computers sold in the UK last year were sold over the Christmas period. Another survey predicted that by 1985 over 2 million households would have their own computer. For a rule of thumb guide to what the exhibition will be like, other shows which Clapp and Poliak have organised include The Computer Trade Forum and The Scottish Computer Show. The show is to be advertised on radio, television and the press and there will be a firework display and bonfire to coincide with the Guy Fawkes celebrations.

Galluim Arsenide

There is a couple of things happening in Japan at the moment that could dramatically alter the performance of computers in the future, the first concerning integrated circuits. At the moment these circuits are based on silicon but the Japanese are now researching circuits based on Gallium Arsenide which would quickly outstrip the current mountain of computers available in terms of speed and efficiency used in scientific and engineering laboratories right through to integrated office systems. If the CPU were to be made of Gallium blocks it is estimated that they would be capable of up to 50 times greater performance. Should this happen, the use of GaAs technology would stretch its use far past the limited number of specialist computers into a larger and therefore more dynamic market. To put it more clearly, Japanese engineers are working on chips like 16 by 16 multipliers and 1000 bit static Random Access Memories. Something less exhilarating, but more immediate, is the development of Personal Basic that operates with CP/M 86 and MP/M 86. This version of Basic lets the user correct errors as they write their program instead of the user having to run their program only to find out that it does not work. This is done by assessing the program statement syntax as soon as the statement is entered. Should an error be found, the relevant error message pops up in standard English. The amount of memory requirement for Personal Basic is at least 96K RAM and the cost is £100. Closer to home, Nottingham in fact, is another version of BASIC called BC Basic for the 64 which costs just £19.95. The main features of this language are two 9K hi-res screens which are independent of each other. Two modes accompany the screens, these being two colour 200 x 320 and four colour 200 x 160. With regard to sprites, there is a total of 22 commands and functions which may refer to more than one sprite. The sound is catered for by 18 commands and functions utilising the facilities of the SID chip and this includes facilities like Filter, Cutoff, Resonance and Waveform. BC Basic is available now on cassette from B C Computers, 31a Grosvenor Avenue, Sawley, Long Eaton, Nottingham NG10 3FQ.

Draughtsmen's Aid

Taylor-Wilson Systems Ltd. have come up with a computer aided draughting system which, they claim, beats most comparative systems for the price. This system, called Autoplan, costs £8000 and comprises an 8032 computer with a dual drive floppy disk system and the A3 1010 plotter/digitiser from Gould.

The whole system is based on a series of shapes which are stored on the disk as drawings. The drawings are formed by using a series of commands which can edit, scale, deform, rotate, shear and dimension the various shapes. It is possible to reconstruct complex drawings consisting of several separate elements with a single command.

Autoplan was first put on show at the Design '82 exhibition at the National Exhibition Centre last September and a prototype version has been used successfully by Derbyshire County Council.

Area: *Draughting.*
Company: *Taylor-Wilson Systems Ltd.*
Address: *Station Road, Dorridge,*
Solihull, West Midlands
B39 8HQ.
Tel: *05645-6192.*

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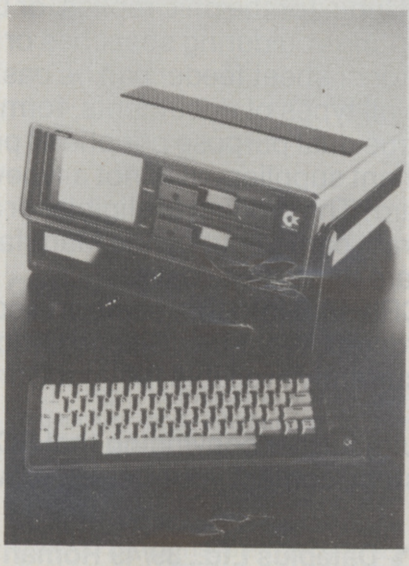

The "SX64"

Also at the Commodore show were some new products from Commodore making their UK debut, perhaps the most important of which, was the SX64 portable computer. This is really a version of the 64 apart from one or two alterations. The first to note is a built-in 5" colour monitor and optional dual or single disk drives and it is compatible with all the software currently available for the 64. Although this model is not yet available in this country, when it does come which will be some time later this year, prices are expected to start at £650. Following this, there are several printers, these being the 6400P, the 4023 and the 1526. The 6400 is a daisy wheel machine which operates at a speed of 40 characters per second. The printer has an optional tractor feed facility as well as a self-test facility to check the internal parts of the printer. Costing £1,195, it can operate with various standard print wheels. The other two printers, the 4023 and the 1526, are both dot matrix tractor feed, with alphanumeric and graphics characters and whilst the 4023 interfaces to the business machines, the 1526 connects to the VIC and 64 with both machines, allowing white characters to be printed on a black background, as well as the usual black on white. The 1526 costs £345 and the 4023 £395 both excluding VAT. Also on show was the 1701 14" colour monitor which should suit all users of the 20 and 64 at only £230 including VAT.

Winchester

Built around the Z80A processor, up to 12 CBM computers can gain access to the AP 18 multi user hard disk system and all the connected computers can access information simultaneously, carrying out the same or widely differing tasks. However because the system manages each user independently and if the file and record looking facility is in use, then this simultaneous access is prevented. As everybody should know, the complete contents of a hard disk memory should be backed up regularly onto another data support and this Winchester system offers two choices. The first, is a second disk drive in the same unit, raising the number of logical drives from four to eight and the capacity from 18 to 36 Mbytes, or, you can have a data streamer in the same unit which copies 18 Mbytes in about half an hour. You could of course always use the 8250 but this does have limits as far as the amount of data to be stored is concerned. For output, practically any printer can be used as a common device. The memory capability of the system is 64K and the drive comes from IMI Computing Ltd., PO Box 216, Witton, Birmingham B6 7BA telephone 021-356 4925/4848.

Magpie

Yet another data base system is about to wing its way on to an unsuspecting public, this one coming courtesy of Audiogenic Limited and going under the name of Magpie. This DBS is for the 64 and is supplied on a cartridge, whilst all the data generated by the user is stored on disk. This is of course a menu driven program with four keys controlling the entire menu operation and each menu is accompanied with the option to progress to other menus. Should this option be taken, then the second menu slightly overlays the first and so the user can chart their progress through the system. Each application for Magpie is controlled through one menu, which forms part of an integrated system, so that order forms are linked to invoices, which cuts out a lot of unnecessary work. Each record has a maximum length of 254 characters and a definition limit of 52 fields per record, the information being stored and accessed via several methods ie by number, key, sequential access, packed storage and sequential search. This DBS can also read and write data to ASCII sequential files so that information can be passed from Magpie to Wordcraft 64 an other spreadsheet programs. It is intended that complementary application disks will soon be available, the initial disk including mailing, invoicing, basic accounting and stock control. Audiogenic are at P.O. Box 88, Reading, Berkshire, telephone 0734 586334.

Sequential Filing on the 64

There is a new word processor out for the 64. It comes from Wego Computers Ltd. and is called the WordPro 3 Plus/64. The system is compatible with a 1541 disc drive and will operate with printers connected through the serial port. The interface needed for this, is of American design and can be Centronics parallel or RS232. This is sold separately although any other interface that will connect to the serial port will suffice.

The unit will run dot matrix or daisywheel machines. The filing system is sequential, the size being 329 lines of text 40 characters wide per file. Wego have priced the word processor at £80 plus VAT. More information is available from Wego Computers Ltd., 22a High Street, Caterham, Surrey, telephone 0883-49235.

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NEWS

NEW PRODUCTS

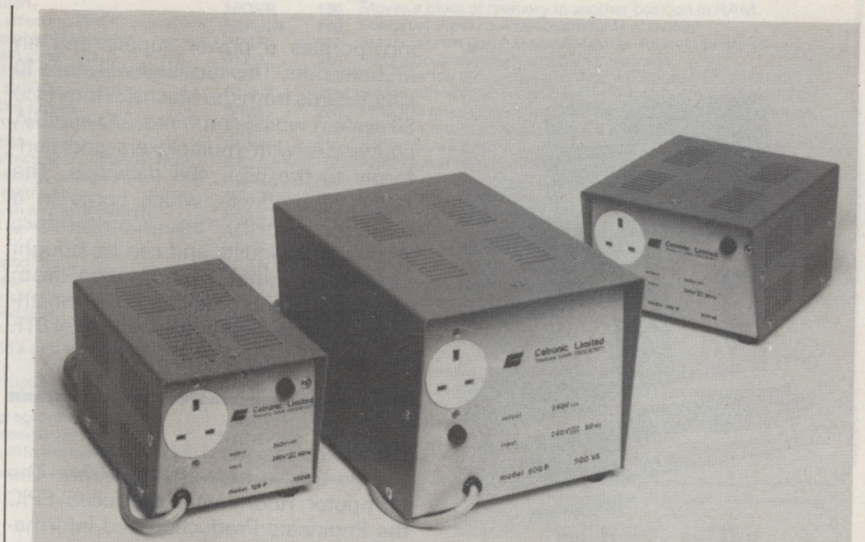
Switchable Ram Packs

With the continued popularity of the VIC 20 and a huge amount of adds-on currently available it is no wonder that many people are buying RAM packs. Most of these are the same as any other make. Have you ever tried the 16K and 32K packs from Ram Electronics? The innovative idea with these two packs is that they both have switchable positions.

The 16K has only one switch with three positions. Power up on the VIC with this switch to the right will display the message "19,967 bytes free" but if you have an 8K pack plus motherboard and the 16K, then you set 28,159 bytes free which is obviously an advantage. Memory on the VIC is divided into blocks and with the 16K and 8K and the switch to the right, blocks one and two come into use. With the switch to the left, you get blocks two and three.

The 32K pack on the other hand has three switches of which the left and right hand switches have two postions and the third switch has three and is applicable to the unexpanded VIC and VIC's with 3K, 16K, 24K, 24K plus hires and the 32K. Each switch on the 32K controls one particular block within the centre block controlling block 5 and the hi-res area. The advantages with this product are pretty obvious although you must make sure that the blocks that you enable with the packs are not already used by cartridges and adventure game cartridges require the RAM pack to be unplugged.

Area: *RAM packs.*
Company: *RAM Electronics*
Address: *106 Fleet Road, Fleet,*
Hampshire.
Tel: *02514 5858.*



Clean Voltage

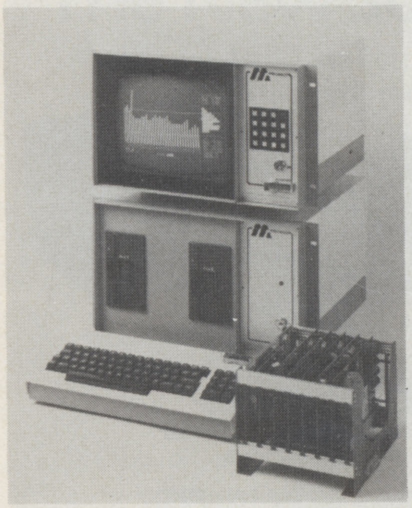
Cetronic Components Limited have come up with a new range of transformers known as the Reguvolt P range, to overcome any serious irregularities and interference in the electricity supply. In fact, Cetronic are so confident about the reliability of their product, that they guarantee a clean supply regardless of the type of mains disturbance. As an isolated second piece of circuitry it should give complete electrical isolation between the mains and the computer and there is a limit to the overload current to protect equipment against damage during a fault. The models are available with ratings of 120, 250 and 500VA, although special voltages and frequencies can be supplied to order, and thus the application can be attached to micro, mini and mainframe computer installations. They also come in a variety of sizes, the largest model measuring 255 x 180 x 167 mm and weighing 13kg. The actual life of the transformer – the guarantee is for two years – is anything from five to 10 years depending on how often it is called in to use and the environmental conditions. The 120 costs £110.25, the 250 £137.25 and the 500 £187.25.

Area: *Backup Electrical Supplies*
Company: *Cetronic Components Limited*
Address: *Hoddesdon Road,*
Stanstead Abbotts, Ware,
Herts. SG12 8EJ
Tel: *0920 871077*

Kestrel

There is a brand new comprehensive series of accounting software which has just been made available for the 64. It comes from Kobra Micro Marketing and the three packages are being marketed under the name Kestrel, these being the sales, purchase, and stock control systems. On the purchasing side of things, the systems' capabilities are limited to 300 ledger accounts and 2000 transactions per month and each purchase can go under any of 100 headings with four sales categories. Postings to the ledger can be invoices, credit notes, payments and debit or credit adjustments. Many of the facilities that are available on the purchase system can also be found on sales and stock control, although obviously there are differences. The sales account has the same number of ledgers and transactions per month as the purchase account, although the stock control can handle 1000 stock items and 2000 movements per month. This part of the accountancy package also has a global price change facility and all the necessary order reports. This sounds like a good suite of 64 business software and Kobra are backing this up with a scheme, whereby the customer pays an annual fee of £10 and receives telephone support from the Kestrel hotline and free copies of program and manual updates.

Still on the subject of Kobra and business software, Easy CalcResult now comes in versions for the 8000 series and the 64. This is a cassette based version of CalcResult 64 and costs only £69. For further information contact Kobra Micro Marketing, Duramark House, Farm Road, Henley-on-Thames, Oxon RG9 1PF.



CBM: The Industrial Rack

The CBM 700 has become totally transformed! It has been put into an environmental casing that fits neatly into a 19 inch industrial racking system, the purpose of which is to meet the needs of factories, processing plants and systems engineers, in research and industry. This industrialisation process has been carried out by Machsize and is not only peculiar to the 700, because they have also revamped the 4032, 8032 and 8096 and associated peripheral equipment. The data terminal for the 700 still has the 80 column display and 256K RAM for machine code programs. Each terminal includes cassette storage as well as the central processor and the video screen and an optional piece of equipment is the limited key-pad which fits directly on to the housing of the screen. This key-pad does not have the full set of alpha-numeric characters, as it is intended that this facility should satisfy the day-to-day requirements of industrial workers. A keyboard with the full set of characters can be plugged into the terminal and the interface, to connect the two (along with other items of equipment) is also supplied by Machsize. The industrialised peripherals include the 4040 and 8050 dual drive floppy disk stores and a rack-mounted tractor drive printer. Also included is a back that lifts off easily and thus allows quick access. For servicing, the terminals and disk drives have a built-in cooling system to prevent them from getting too hot. Machsize have not left their rebuilding at this point, because they are also supplying a new interface rack that incorporates a power supply and an IEEE decoder. This rack unit will store 10 circuit cards from the Machsize Interface 80 system which combines A/D and D/A convertors with multiplexers and conforms to the IEEE 488 data bus. The range of products, which come in a two-tone finish, are Commodore Approved Products and can be bought separately. Further information from Machsize Limited, Collins Road, Heathcote Industrial Estate, Warwick CV34 6TF. Telephone: 0926 32141/2/3/4/5.

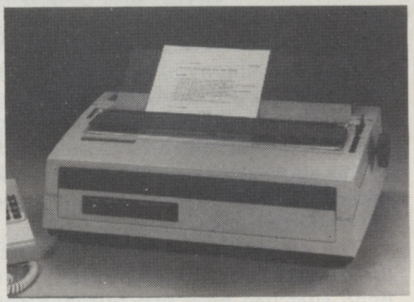
Hustler

Bubble Bus, a new offshoot from The Computer Room who produced EPIC the Engineers Production and Information Control system have come up with their own version of pool, this one being called Hustler. This game is for use on the 64 and the user is given a view of the actual table, on which may be played six different versions of the game, which includes titles like Minipool, Superpool etc. One or two people are allowed to play the game. All the programs are written entirely in machine code and these are accompanied by music – if you listen closely you may realise you have heard the music somewhere before. These games are available from retail outlets or direct from The Computer Room.

Area:	*Games*
Company:	*Bubble Bus*
Address:	*The Computer Room,* *87 High Street, Tonbridge,* *Kent*
Tel:	*0732 355962*

Super Rexagan

At the recent Commodore show, Imperial Chemical Industries were showing off their interfacing systems, amongst which, was Super Rexagan which allows for the control of laboratory and engineering systems. This system consists of a master unit which connects to the microcomputer and signal modules which slot into the master unit. Each master unit will accommodate 10 signal modules of which there are seven different types. These being the analogue input and output, digital input and output, power controller, frequency input and the serial input and output of which any combination is acceptable, so you can connect it up to micros, spectrometers, valves, thermometers, et al. Each master unit incorporates its own power supply and watchdog system which can be used to activate alarms or shut down equipment. The distributors for this system are Dyson Instruments Limited, Sunderland House, Station Road, Hetton, Houghton-le-Spring, Tyne & Wear DH5 0AT telephone 0783 260433.



Ah So! cheap

Sanyo have entered into the printer market with what they term is an inexpensive daisy wheel printer. Costing £799.25 pence, I would not call it inexpensive, even though that price does include VAT. The printer goes by the name of PR5500 and is compatible with most word processors. Like most other printers around at the moment, this one has bi-directional printing at a speed of 16 characters per second and the output can be in bold type face with subscript, superscript, double striking and underscoring. The characters, of which there is a set of 96, are set, so that there is a choice of 10, 12 or 15 to the inch on paper and no wider than 17 inches. There are other variable factors as well: line spacing offers 48 positions per inch, the top and bottom margins can be adjusted and there are horizontal and vertical adjustments that can be made to allow for various printing functions. Currently available only in tractor feed form, Sanyo plan to market a single sheet feed system.

Area:	*Printers*
Company:	*Sanyo Marubeni (UK)* *Limited*
Address:	*8 Greycaine Road,* *Greycaine Estate,* *Watford, Herts. WD2 4QU*
Tel:	*0923 46363*

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DISP	140	Displays a prompting or warning message on a given line.
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DSEARCH	330	Searches a disk relative-file for a given string or pattern.
DUMP	170	Outputs the names and values of all current scalar variables.
EDIT	70	Adds 'delete-forwards' function.
EXEC	140	Executes a string as a BASIC command.
FIND	200	Lists all lines in which a given character string appears.
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GSUB	110	Performs a GOSUB to a given labelled line.
GTO	90	Performs a GOTO as above.
INPUT	40	Allows a program to continue despite a null entry being input.
INVERT	160	Turns a string back to front.
IRQ	60	Restores normal system use of interrupts.
KILL	20	Takes out SOFTCHIP commands.
LINES	50	Calculates the number of lines in a program.
LWIND	170	Loads a screen display from a compressed format file.
MERGE	360	Merges a program from tape or disk into the current program.
MON	10	Enters the CBM machine-code monitor.
MOVE	130	Moves a block of memory to another position in RAM.
NUMIN	740	Foolproof input routine for amounts of money.
PCTRL	100	Set the device number and characteristics of the printer.
PLOT	170	Plots a double-density point on the screen.
POP	30	Removes the last subroutine return address from the stack.
PRINT	130	Adds routine to automatically right-justify amounts of money.
PRINT	280	Modifies all printer-output as needed and adds TAB function.
PUSH	60	Pushes a return address onto the stack.
RENU	930	Renumbers a program, altering all GOTO's, THEN's, etc.
REPEAT	50	Adds repeat key function.
REPLACE	490	Replace all occurrences of one character string with another.
RESCUE	40	Recovers a program accidentally 'NEW'ed.
RESET	170	Resets a double-density point on the screen.
RESTORE	20	Restores DATA back to a given line number.
REVERSE	50	Reverses the field of the screen.
SCAN	190	Scans a string for the next occurrence of a given character.
SCOPY	340	Copies the screen to the printer.
SCROLL	230	Scrolls screen contents up,down, left or right.
SEARCH	270	Searches an array for a given string or pattern.
SHRINK	180	Removes all unnecessary spaces and 'REM's from a program.
SORT	760	Sorts any one-dimensional array (and tags another array along)
SWAP	440	Loads in another program, retaining all variables.
SWIND	150	Saves the contents of the screen in a compressed format.
TRACE	110	Displays the last six line numbers at the top-right screen.
VAR	390	Outputs the names of all variables referred to in a program.
WINDOW	30	Sets top, bottom, left, right for an 8032 screen window.
WPOKE	50	Pokes two memory locations in hi-lo 6502 order.

★ ★ NEW COMMANDS NOW AVAILABLE

BORDER	100	Draws a border around the edge of the screen
CLOCK	250	Continually displays the time at a given screen position.
GRAPH	20	Gives access to the box-drawing characters on an 8032
ON	50	Branches to program line corresponding to key pressed.
PROTECT	90	Allows regain of control after system crash.
STATS	120	Outputs the number of statements in the current program.

★ ★ NEW FUNCTIONS which may be used in any expression

AVG	140	Calculates the average of the elements in a numeric array.
BLANK	40	Tests a string : returns true if the string is blank.
DEC	80	Gives the decimal equivalent of a hexadecimal number.
FACT	60	Provides the factorial function.
GAMMA	90	Provides the gamma function.
HEX$	90	Gives the hexadecimal equivalent of a decimal number.
MAX	120	Returns the maximal element of an array.
MIN	120	Returns the minimal element of an array.
NORM	160	Provides the normal distribution area function.
PAD$	90	Pads a string with spaces.
QUME$	70	Assists high-resolution plotting on QUME Sprint 5 printer.
SHR$	260	Gives the compressed form of a number for compact storage.
SPC$	30	Gives a string of spaces of given length.
SUM	130	Returns the sum of elements of an array.
WPEEK	40	Peeks a two-byte address.
XPD	220	Decompresses a number.

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What will they think of next ?

NEWS

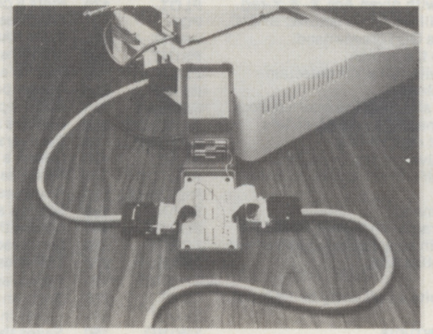
NEW PRODUCTS

Name change for M.M.S.

According to Shane Barnes, the manager of MMS Limited who are based in Ketwell House, 75/79 Tavistock Street, Bedford, the logo initials of the company are being too widely and innocently adopted by other manufacturers and this situation has become far too confusing from a sales and marketing point of view. The obvious answer to this problem, is to change the company name and this is exactly what Barnes has set out to about doing. The software will now go under the name, of Facts Software Limited and the dealership changes from MMS to SWW. Nobody appears to know what the new initials stand for, but it is connected with some kind of advertising ploy. What has all this got to do with new software? Well the fact is that a new range of software products are available from another MMS Limited which is not to be confused with the one above. This MMS Limited (and not SWW) call themselves Marketing Micro Software Limited and they have a total of nine packages which run on the VIC 20. On the games side of things, there is Barrel Jumper in which you have to confront a barrel-throwing ape on the rampage in a city and to run this game you must have 8K expansion. Continuing on a jumping and leaping theme, there is Johnny Jumpet who is late for his supper. This young gent has to avoid the deadly white mice on his race home and the strange bridges which have the habit of dropping you on the spikes below – not a very nice way to go at the best of times! Road test is also a dangerous game for sprites because crashing or running off the road in atrocious weather is certain death. Reversal and Reflections are both an awful lot safer. Reversal is a computer chess game on an eight by eight chess board format. This has also been called Othello or Reversi. Reflections is their last game (so far) for the VIC and the aim here is to demolish a star by hitting a ball with floating paddles.

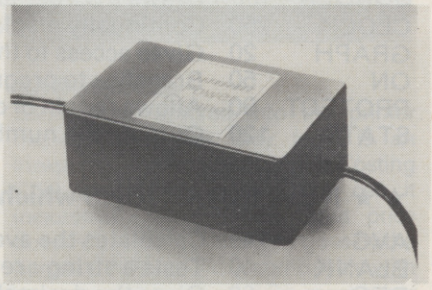
All of these games are for the unexpanded machine unless stated. MMS also have something called VIC PAK 1 which is a collection of unexpanded cassette programs for the VIC 20, one of which is called U-Draw. This is a simple drawing program, which offers eight colour block graphics, for you to create on the television screen. Then there is a program called Expectancy, which will not calculate the chances of getting your wife or girlfriend pregnant but it does in fact enable you to feed in personal information to provide a rough value for life expectancy. Mortgage is a program to find unknown variables for principal, monthly repayment, term and annual interest. In Elements, all you have to do is name the chemical symbol associated with the chemical. Calendar is a self-explanatory title and Statistics introduces the computer as a sophisticated calculating device. Once you've figured out the computer as a calculator, you can have a look at Marblestat to calculate probability and chance.

By now, you may think that the list of products is long enough, but we have a few more things to run through, which are not included in the VIC PAK. Drawings may be stored be etched in any of seven colours by a keyboard or a joystick. Called VIC Sketch, the drawings may be printed, saved or erased. For everybody who wants to develop their mathematical skills, there is a program called Maths Duel which throws up problems in addition, subtraction, multiplication and division. Each operation has three levels of difficulty and once you have conquered one, you move on to the next. Fancy yourself as a modern Beethoven or the greatest lyricist since John Lennon? Well Composer might not be that good, but it does have a music sheet of up to 44 notes which are entered by keying in numbers from nought to nine. This program gives a range of 2.5 octaves and thus you can produce both sound and notation for simple melodies which can be stored and played back from a datasette recorder. All of these three programs are for the unexpanded machine and they all come on cassette. There should be enough there to keep you satisfied for some time and make sure you contact MMS Limited (and not SWW) on Goddard Road, Whitehouse Industrial Estate, Ipswich IP1 5NP telephone 0473 462721.



Inmac

Inmac have recently hit the market with a couple of products, the first one being a mains interference suppressor called PowerCleaner which will detect any voltage above a certain level and earth the surplus. This compact little box plugs directly into the mains, with the equipment that is to be protected, plugging directly into the unit's own three pin socket. There is a 3A version which costs £69.00 and a 6A version which costs £119.00. This product has a one year guarantee, 30 day trial period and a next day delivery service. The second product they have is an RS2320 Interface Tester which should indicate whether any communications problems exist between modems, terminals, printers etc. How does it do this? Simply by connecting the male and female connectors to the interface cable and 12 LED's light up to display the state of different signals such as Transmit Data and Data Ready. Testing equipment can also be performed on a selective basis owing to the selection of switches as well as by cross-patching between connector pins by using the jumps provided. There should not be any severe drainage of energy whilst the testing is being performed because the unit has its own battery supply. The I/O tester comes in a plastic casing with batteries included and costs £150.00. This product also has the 30 day trial period and one year warranty. Both items are available from Inmac (UK) Limited, Davy Road, Astmoor, Runcorn, Cheshire WA7 1PZ. Telephone: 09285 67551/2/3.



Micro Interface

Wego Computers Ltd have now made available a VIC and CBM 64 interface which fits into the serial port of the computers and into the parallel port of any Centronics type printers. This device is completely compatible with other devices on this port such as disc drives and so on. This interface, which transmits seven bit data as standard and can be altered to transmit eight bit data, can be set to device number four or five.

The power for the interface is supplied by a five volt line from the printer to pin 18 of the parallel printer connector although this can apply to other printers which do not have this facility as standard, as long as a small connection is established within the printer to its parallel port.

It is priced at £79 plus VAT.

Area: *Communication.*
Company: *Wego Computers Ltd.*
Address: *22a High Street,*
Caterham, Surrey.
Tel: *0883-49235.*

Record Keepers for the Office

Precision Software have announced that several new products will be on exhibition at the PET show, including Superbase and Superoffice. Superbase is a DBS record manager with facilities similar to Silicon Office. The records are created on screen with a large number of fields including percentages and constants for VAT and a full calculator which calculates between fields on the form created.

There are two versions of this, one for the 64 and the other for the 500 and 700 series. The 64 version, which will cost around £100, will have the data base only, linking to Easiscript via the cartridge port.

Superbase for the 500 and 700 series, costing around £450 and the hard disk version costing £495, connects to Superoffice and an improved version of Superscript called Superscript 2. Superoffice has a record size of 1000 characters with 128 different fields. The records are redefinable with a maximum of four screens per record. Superoffice is expected to be priced at £825.
Superscript 2, which should be available by mid-May, performs calculations via the full calculator and also has mailing and mail-shot facilities. New commands are also added, two examples being Alternate Headings and Alternate Offset Margin which enables a margin in, say, a book to be switched to left or right.

There is also the facility to select which area of text is to be printed and then you can go back and edit it where necessary. On the same disk, there is a fully integrated program for Superspell II which gives British and/or American spellings along with the option to add your own names and words to the dictionary.

All of these products are approved by Commodore and they may be exhibited in America following talks with Commodore's boss, Jack Tramiel.

Precision Software's next step will be to produce applications for the office system such as pre-programmed vertical market applications.

Area: *Database systems.*
Company: *Precision Software.*
Address: *4 Park Terrace, Worcester*
Park, Surrey KT4 7JZ.
Tel: *01-330 7166.*

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GORF
COSMIC JAILBREAK
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Games

Five new cartridge games for the VIC 20 including the successful arcade game, Gorf. This particular package is made up of four space adventures these being Astro Battles, Laser Attack, Space Wars and Flagship. Each game uses a joystick and it is not until you have successfully overcome the first challenge that you can begin to overcome the next desperate situation. The cost of this package is £24.95. In Cosmic Jailbreak, there is a cell somewhere in the depths of space which holds one dangerous prisoner. You are the jailer and your job is to prevent the alien environment – which is made up of spaceships, bugs, meteorites etc – from releasing the convict. Cosmic Cruncher is another of the you-against-them type of games and as long as you keep on destroying the alien satellites, you're alright. Now we move from the mundane stuff to the ridiculous, in Menagerie which has computer fleas on "a treacherous journey to home base" avoiding the flea-eating crocodiles. The last game, Money Wars, does sound a little bit more realistic and sensible. The excitement here is that instead of being the protector, the user is actually the thief who has to escape with as much money as possible. This game is played from the keyboard. All games cost £19.95 and have a joystick and keyboard option unless stated otherwise. From Commodore Business Machines and dealers.

SOFTWARE REVIEW

Arcade Games for the Commodore 64

Jumpman

A disc based arcade game for the Commodore 64, which requires much more than just quick reflexes if you're going to succeed in your mission and rescue Jupiter Headquarters from doom and destruction.

The game also requires a joystick to be installed in port two.

Getting Started

The first program on the disk is a simple and short one that boot-loads the master program that controls all the action. Whilst waiting for this 26K masterpiece to load, you're given a large scale view of a scene from the game. At least you've got time to adjust the colour and contrast before starting to play.

You could also take a look at the manual that accompanies the program.

This gives a straightforward explanation of the game, and how to play it, as well as some helpful hints for achieving mega scores.

And Into Action

The snappy demonstration at the beginning is well worth watching, as it gives a nice insight into the working of the game. Pressing return at any time takes you into the game proper.

You control a little man, whose job is to run around a collection of ladders, girders and ropes, dodging various hazards en route, and collecting a number of treasures at each level. There are thirty one levels in all, and each one features a different scenario, as well as different obstacles.

Simple, eh?

Well, not really. In addition to the number of levels, each one can be played at eight different speeds, ranging from soporific to suicidal!

After pressing return, you are presented with a five option menu, which allows you to start at beginners (levels 1 through 8), intermediate (9 through 19), or advanced (20 through to 31), so through the whole lot is a grand loop from 1 to 31, or finally leap about from level to level in a totally random manner, never knowing which one is coming next.

The individual difficulty of each level doesn't seem to progress in a logical way, for instance level 6 is much easier than 5, but as a complete group the above distribution is probably fair.

It would be difficult to describe each level in detail in a review of this length, but some of the hazards you'll encounter are vampires, dragons, copy-cats who follow you about and generally get in the way, robots, bombs, missiles, and many others.

On some levels you'll have to attempt seemingly impossible leaps into space, climb up and down ropes whilst hoping nothing hits you, and on quite a few of them you'll also have to exhibit a fair degree of intelligence.

Some of the treasures will seem to be unreachable: there are no ladders going anywhere near them, no ropes to climb up or down, and the leap is far too great to even contemplate. However, a common feature of the game is that, as you collect things, ladders move about and appear or disappear, girders crumble or are re-created elsewhere, and so it becomes a question of doing the right thing in the right order at the right time!

Conclusion

A brilliant game!

Very occasionally an obscure bug appears, and stops a game after you've completed a level. However, pressing return gets you back to the menu again.

As a reviewer, one gets to see an awful lot of games. Of all the games I've seen so far on the Commodore 64, this is one of the few, the very few, that I would actually go out and buy.

Product:	*Jumpman*
Area	*Arcade Game*
Price	*£27.45*
Configuration:	*Commodore 64, Disk Drive, Joystick*
Company:	*Maplin Electronic Supplies Ltd.*
Address:	*P.O. Box 3, Rayleigh, Essex SS6 8LR*
Tel:	*0702 554155*

Three brilliant pieces of arcade software for the Commodore 64 this month, all from the Llamasoft stable, and we'll start with a look at Attack of the Mutant Camels.

Attack of the Mutant Camels

This, like the other two, is supplied on cassette, and requires a joystick to be installed in port 1 before you can start playing the game.

The scenario owes a lot to the Star Wars saga of films. You are defending your base against an attack of deadly mutant camels. These have been kidnapped by the enemy, and, by some devious genetic engineering, the normally harmless beasts have been transformed into 90 foot tall, neutronium shielded laser spitting death camels!

With your highly manoeuverable space craft, your task is simple: to destroy the camels and save the base from destruction. Should you fail, you are yourself destroyed in a dazzling display of graphical pyrotechnics. Leaders can be so fickle!

To begin with there are six camels hot on your trail, and to a devastating backbeat of thunderous hooves the beasts march ponderously towards your base. Picking them up on your scanner (displayed constantly at the top of the screen), you must rush to the attack.

Being neutronium shielded it takes a lot of missile hits to actually destory one of the camels. As the missiles find their mark the camels gradually change colour as the shields weaken, until, with a final volley, the dying camel rears its head skyward and emits a piercing scream as it perishes. But, if you continue firing as it dies it turns into a new mutant, and, moreover, one that cannot be killed. It may turn many different colours, but it still marches relentlessly onto the base and your ultimate doom.

SOFTWARE REVIEW

To defend themselves, the camels have two types of weapons. One relatively harmless laser that flits about the screen, from which you can survive four direct hits, and one that homes in on you: a hit from that is fatal, and another one of your five lives bites the dust.

Destroy all six camels, and you are faced with a hail of missiles which you must frantically dodge. A quick hyperspace jump later, and six more camels appear, more deadly, and more determined to destroy you than ever.

And so it goes on, thirty one levels in all, and level thirty one, let me tell you, is suicide within seconds.

Verdict

A great piece of software, definitely one of the lover of high speed action games, and it's nice to see someone using the capabilities of the 64 to the full. A snip, at £8.50.

Gridrunner

The game that's taken America by storm, as the advertisements would have us believe. No-one has ever progressed beyond level 13, they say.

One does tend to treat advertisements with a certain amount of justifiable cynicism, but in this case they are absolutely right.

Once again Llamasoft put you in the role of sole defender of earth freedom. The action takes place in the dim and distant future, where earth has erected a grid in outer space, the purpose of which is to supply energy to us humble earthlings below.

Alas, the energy being supplied is not as great as it should be, and investigations reveal that this is the work of horde of aliens, bent on earthly destruction. Needless to say, you are sent up there to destroy them.

The aliens take many forms!

Caterpillar-like life forms stalk about the grid, getting ever nearer the bottom of it (and you!: you're restricted to the bottom seven rows), and these must be destroyed before you can progress to the next level, out of a total of thirty one levels in all.

Each segment of the caterpillar that you hit turns into a 'pod', which goes through an evolutionary life cycle before unleashing a bolt of energy down the grid, or screen.

These bolts are lethal, as are those fired by the so-called 'X-Y Zappers'. These patrol the boundaries of the grid, and fire at you as they wander around.

As you slowly progress through the levels, the action gets even more furious, more and more 'caterpillars' appear on the screen, moving faster all the time, until you reach lunacy level. At this point the many lives that you've built up over the earlier, easier, levels disappear, and you just have to play another game.

Verdict

Another one for the library, if you like fast and challenging arcade games that are different from the usual run-of-the-mill pub-ripoff games. At £8.50, Gridrunner is worth every penny.

Matrix

'Son of Gridrunner', is the easiest way to describe this latest arcade game for the Commodore 64 from Llamasoft.

After vanquishing the enemy, the earth was at peace for a millenia or two. But then people began to notice that energy was being sapped from the grid once more, and immediately knew that the aliens were back!

And back with a vengeance. New life forms had appeared, more deadly than before, and early explorations had reported mysterious sightings of camels on the grid!

As an experienced gridrunner pilot, you are called upon to save the earth from doom once again. It must get tedious being a superhero, but you rise to the challenge and fly off to do battle.

The scenario is as before, with all the action taking place on the grid, but there are subtle differences. When pods reach the bottom they no longer re-appear eight rows higher up, but start bouncing around the screen like frenzied billiard balls, which makes them very difficult to hit.

A couple of levels into the game, and a little man appears at the top of the screen, guiding the X-Y Zappers so that their fire becomes more accurate. He unfortunately cannot be killed, and is, basically, a nuisance!

Levels four and five, as well as having a blank background, feature camels wandering around the screen, and a missile deflector in the middle. This, whilst occasionally causing you to kill yourself, deflects the lasers fired by the X-Y Zappers also: frantic stuff!

And so it goes on, amazingly fast and furious, and you'll be totally exhausted after just a few games.

Verdict

A great game, as long as you like the actin fast, and don't mind being obliterated within seconds at the higher levels.

Totally addictive.

Area:	*Arcade Software*
Titles:	*Attack of the Mutant Camels* *Gridrunner* *Matrix*
Price:	*£8.50 each*
Configuration:	*Commodore 64, Cassette Deck, Joystick*
Company:	*Llamasoft Software*
Address:	*49 Mount Pleasant, Tadley, Hants.*
Tel:	*07356 4478*

The Temple of Apshai

The Temple of Apshai, a disk based 'dungeons and dragons' game, was once voted the Computer Game of the Year.

This month we're taking a look at a new version of the program for the Commodore 64, and seeing if it really is worthy of that title.

Two further games, The Upper

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For further information and details of your local dealer

commodore

Reaches of Apshai and The Curse of Ra, have sprung up in the wake of the success of the parent game, and we'll have a brief glance in their direction as well.

Getting Started

The master disk (copyable!, but respect author's copyright please) contains all the necessary program data, and after the first main program has been loaded some atmospheric music and a character set changed to olde english lead you into the start of the game.

Getting started is a long process, because before the game proper can commence, you have to adopt the role of a character. As you will be this character for the rest of the game, and your ultimate fate is determined by the attributes of this character, it's worthwhile spending some time in choosing the right personna.

Either you or the computer can choose such items as strength, intelligence, stamina, and so on, and having selected all that you then have to enter into some hearty bargaining for swords, shields, armour and so forth.

You only have a limited supply of money, and must spend wisely. Magic arrows, whilst extremely useful, are expensive: ringmail armour is better than leather, but costs more. After a few games you will soon settle on a favourite character, suitably named of course, up to a maximum of 12 letters, and this can be saved onto disk for recall into later games.

And Into Action

You are standing at the entrance of the ancient Temple of Apshai, and your task is to explore the ruins and collect the treasures that are still rumoured to be found there.

In your explorations you will meet with many perils, and there will be problems to be solved before all the treasures can be gained.

In other words, the usual scenario.

Your character is represented on the screen in sprite form, and, as you press the appropriate keys, is seen to move about within the confines of the rooms displayed. The screen contents are updated every time you step into another room or corridor, so that the display is constantly being refreshed.

There are no actual room descriptions presented on the screen, but all of these are contained in the voluminous manual that accompanies the program disk. Thus one saves on both screen and memory space. The manual also contains hints on playing the game, and achieving the best results, as well as descriptions of all the monsters and treasures that you're likely to come across in your travels.

The monsters (antmen, centipedes, vast spiders amongst them) are also displayed as sprites, as are the treasures, although these have a tendency to look more like little mounds of sand than priceless gems. Still, the manual tells you what they all are.

Conflict with a monster is decided on a fairly random basis. The extent of your strength, fatigue etc. obviously comes into play, as does the type of weaponry you're carrying, the sort of armour you're wearing, and so on.

However, an individual combat is decided very much upon your pressing the right key at the right time. This may appeal to some people, but the seasoned adventurer, used to having time on his side and logical problems to solve, is likely to resent this 'key bashing' approach.

The same applies to the rest of the game. There is no time to sit around and arrive at a solution to a particular problem.

Given the 'You've got the cage, the bird, the iron rod, the food and water, now how do you get past the snake?' sort of case, one can sit back, attempt to do various things, and (hopefully!) work out a way of killing the snake and progressing further.

In Temple of Apshai the temptation is to hit out at the nearest key and hope that you do something right.

Also, the manual warns you that exploration may at times be hindered by an unhelpful wall or corridor getting in the way. Pressing the right key to invoke the 'examine' sequence will give you a variety of messages in reply, usually of 'there is nothing here' variety.

But, and again the manual warns you of this, you will sometimes have to examine a wall several times before you get any kind of revealing message.

In other words, every wall you approach MUST be examined in the hope of finding something useful, and, moreover, must be examined several times. This is at best tedious and at worst downright annoying. You constantly waste valuable time in seeing if a wall has got something hidden behind it. This could have been made far more logical.

Once you have managed to progress beyond a reasonable level the game does manage to get a bit more interesting, but again the totally illogicality of it all, to this reviewer anyway, defeats the object of playing an adventure game. One is, after all, supposed to extend one's mind, not one's patience.

The two extensions to the original game, both of which require the data disk from Temple to be present before play can begin (but then again they do cost half the price of Temple), have the ability to take an existing character and transport him/her to the new world of play, and again allow you to roam around rooms, explore new corridors, and collect new treasures, whilst fighting off weird and wonderfully different monsters.

Conclusion

Temple and its offshoots are not games for the true adventure afficionado, nor are they likely to find many new fans amongst the traditional 'shoot-em-up and zap-em-down' arcade players.

As an attempt to merge the two into a traditional adventure setting with real time action it is to be applauded, and the use of the features of the machine (the moody music, the use of sprites and colour) are again a recommendation in its favour.

If you play adventure games already, and find you're getting totally bogged down in every game you play, it's worth a look.

If you're totally new to adventure games, again you could do worse than start with this: it's got the sight and the sound, and it isn't that difficult to progress to a reasonable level.

Dungeons and Dragon players, used to a traditional character playing role, will also find it an interesting introduction to the world of classic adventure games.

However, it is not an adventure in the true sense of the word (aka Crowther and Woods), and one can't really see

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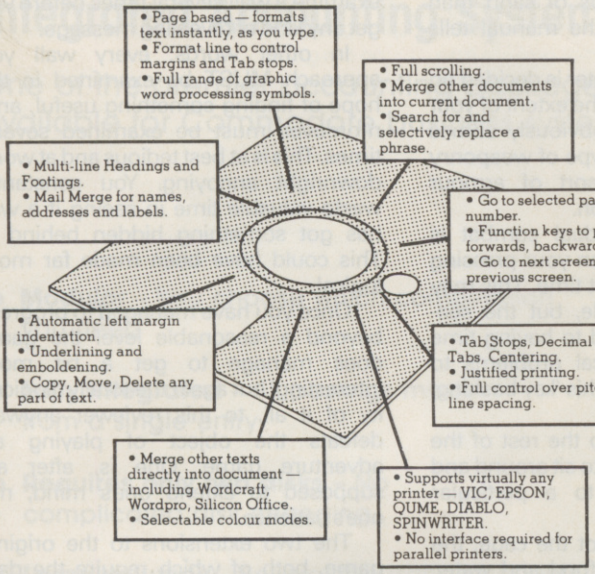
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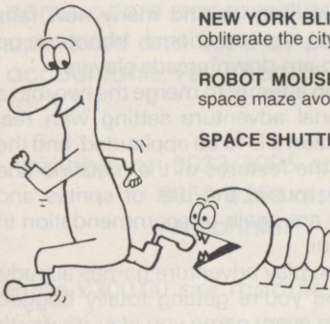

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why it was once voted Computer Game of the Year.

A good game, but it falls short of being a brilliant one.

Area:	*Role Playing 'Epic Fantasy' Games*
Product:	*Temple of Apshai (plus Upper Reaches of Ampshai, Curse of Ra)*
Price:	*£27.45 for Temple, £13.80 for offshoots*
Configuration:	*Commodore 64, Disk Drive*
Company:	*Maplin Electronic Supplies Ltd.*
Address:	*P.O. Box 3, Rayleigh, Essex SS6 8LR*
Tel:	*0702 554155*

Wordcraft 20 the Processor for the more serious VIC

At the time this article was written, Wordcraft 20 was only available for the Vic 20. Although there are at this time loud rumblings of a version of Wordcraft for the CBM 64. The current price for Wordcraft 20 is £125, there is a version available for the Vic without the extra RAM this should be significantly cheaper. Wordcraft is manufactured and distributed by Audiogenic Software, PO Box 88, Reading, Berkshire.

Getting Started

What you actually get for your £125, is a cartridge that plugs into the expansion port, a comprehensive manual and a demo/utility tape.

The cartridge is placed in the expansion port or into an expansion board. When the Vic is switched on with wordcraft inserted you will be greeted with the wordcraft display. At this point the user must select from various options. This is done using the function keys. The first choice is type of printer, the selection is obtained with the F7 key to change the value and the F5 key to move to the next section. Which is a choice of Auto or non auto line feed, no form feed and continuous or hand fed stationery. After selecting the printer requirements there is a choice of disk or tape storage and expanded or unexpanded memory.

Wordcraft is now set up and ready to start, to enter the text area the F1 key is used, or alternatively the user may leave wordcraft and return to the Basic area with or without the extra 8K RAM by pressing the F3 key. This is a nice touch, being able to leave wordcraft and use the extra memory available. One word of warning if you quit wordcraft whilst there is text in it, it will be lost. Also if you hit RUN/STOP RESTORE whilst wordcraft is plugged in it will automatically power return to the wordcraft initializing screen. Any Basic programs will still be in the Basic area and can be accessed by pressing the F3 key. However if the text area is entered any Basic programs will be lost.

In Use

Extra memory may be added to wordcraft using an expansion board in the usual way. For example this review was written using Wordcraft with an additional 8K RAM, giving the user an extra 8K of text area.

Now for the commands and controls available in Wordcraft. Once in the text area there are three display lines at the top of the screen. The first line contains the title and author the second line displays the mode, page, line, column and memory left (which decreases as text is entered). The third line displays any commands or controls given or removed. When the text area is first entered it is in command mode and may format the screen or enter the text area. To enter the text area press RUN/STOP and to exit to command mode again press RUN/STOP. The page length can be set from command mode with; l,n where n is a number from 0-60. To set the page width the format is w,n where n can be from 0-99. To justify the text both left and right the format is j,y or j,n to turn justification off. Loading and saving files takes the format, g, filename, to load and s, filename to save.

There are a great number of commands for Wordcraft and although we will look at some more not all of them will be examined in this review. To replace a previously saved file the format is; r, filename. Wordcraft also has the standard commands such as merge, the format is m, filename, pages. There is an ascii command, this is for immediate use and sends any ascii values to the printer, the format is a,nn,nn where nn is any number from 0-254. There is a keystroke beeper to turn it on type b and to turn it off type b again. The last command in Wordcraft is printing documents. The format to print is p or p,pages,type,copies. This will print specified pages of a document with bold or underlined type and the number of copies required. To simply print the whole document once type p.

There is a whole range of controls for Wordcraft. Perhaps an important feature is the function keys, they are initially set up to do the following. F1 = delete word, this will delete the current word under the cursor. F2 = delete line, this will delete the line from the position of the cursor. F3 = insert on, this will open up spaces for insertion. F4 = insert off, closes spaces left after insertion. F5 = normal tab, this resets wordcraft to its normal tab. F6 = decimal tab, this tabs to the next tab position. F7 = new line, this forces a new line. F8 = new page, this forces a new page. It is very useful to have the function defined although they could have possibly had a better choice of controls.

To use any of the controls other than the function key controls the user must first press the CBM key, control will be displayed on the second line, the control may then be entered. Some of the controls are +n to skip lines, where n is the number of lines, RETURN to start a new line, HOME to force new page. Some of these controls are available from the command level or the function keys.

The other controls consists of moving text, centering text, inserting and deleting blocks, lines and words, moving blocks, highlighting text, search and exchange text. As well as a whole range of tab and ruler commands, together with commands such as fill and other special controls for letters. All the controls are invisible, but can be displayed by pressing the CBM key and 'c', to remove controls from a line press CBM and n then the control you wish removed.

Conclusion

To conclude Wordcraft is definitely good value for the wordprocessing power the package contains, the manual is very good (has even been updated!). The tape provided contains mostly files for letters and formatting within the processor plus a Basic program to convert Wordcraft 20 files to Wordcraft 80, for the Pet. If there is anything lacking it is the speed and agility of the more expensive wordprocessor's. Then Wordcraft does not cost in excess of £1000. It is obviously very slow on storage if you are using cassette rather than disk and is also limited to the amount of memory available on the Vic. Even so Wordcraft is still a good buy, one would need to think very carefully and consider the needs required from a wordprocessor before purchasing one. This is as true of Wordcraft as any other package. It work's very well, the question is what one wants to use it for and will it cope. It is probably not suited to a busy office but well suited for the homework a business person may wish to do.

BOOK REVIEW

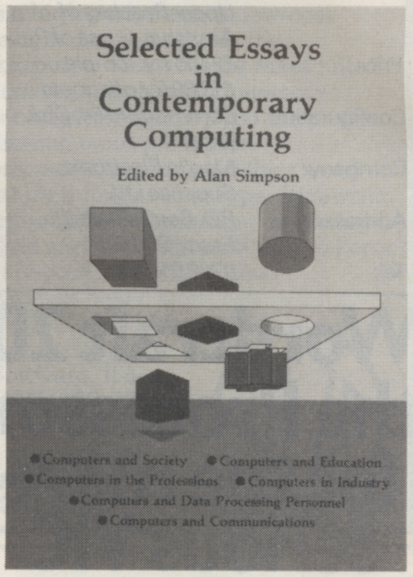
Commodore 64 Games Book

CLIFFORD & MARK RAMSHAW
COMMODORE 64
GAMES BOOK
M

The Commodore 64 Games Book has been written by two young boys and the copy that we got for review was accompanied by a couple of press releases, one of which extolled the virtues of the book and the other told us that the programmes were written over the Christmas holidays – which is perhaps too short a time to write 30 programs even if the authors did take an equal workload. Apart from that, I was quite pleased to see that all of the games were not solely dedicated to mindlessly destroying hordes of aliens, enjoyable though it may be. You can go horse racing and place bets, play cards, have a cowboy shoot-out, a tank attack and, amongst many other wonderful ideas, keep on throwing a turkey up in the air. But unfortunately, not all the programs are wonderful. In Paranoid the aim of the game is to draw seemingly never-ending lines across the screen – is this really a game? – which I found slow and a little bit boring. The next item I found off-putting, was actually in the publisher's note, which reads "We have taken care to design the format in such a way that the programs will be easily read, to reduce the possibility of transcription errors especially with the graphics characters." Not so! The programs – which are not straight listings, but have been re-type set, so errors have inevitably crept in – need more spacing out, because I got lost quite easily whilst typing the programs in and thus missed out text. Secondly, it is unfortunate that the screen illustrations have not turned out in a better quality, as this would give a clear pictorial example of what the screen is supposed to look like, although admittedly the written description of the game is clear and concise. Finally, the book is not error free. The first line of the first program reveals this reading 0 background = 0. Wouldn't it make better sense if the background was changed to 1 or 16? This book is far from the best games book around at the moment and I suppose that the best thing you could say about this book is that it has a nice cover. However, as I have said before, some of the ideas are good, although it's just that they need a little more thinking about – and not just over the holidays!

Title:	*Commodore 64 Games Book*
Price:	*£5.95*
Authors:	*Clifford & Mark Ramshaw*
Publisher:	*Melbourne House*
Available from:	*Glebe Cottage, Glebe House, Station Road, Cheddington, Leighton Buzzard, Bedfordshire LU7 7NA.*
Tel:	*01-405 6347*

Selected essays in Contemporary Computing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in
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Computing
Edited by Alan Simpson
● Computers and Society ● Computers and Education
● Computers in the Professions ● Computers in Industry
● Computers and Data Processing Personnel
● Computers and Communications

The second book for review this month is one of general interest in the computer field and is called 'Selected Essays in Contemporary Computing.' This is not to say that they are of any practical use to budding programmers, because it does not go to any great length over the actual programming techniques, but is mainly concerned with the applications of computers in education, society, industry, business and communications and the social problems that they may cause, such as the invasion of privacy etc. However, if you feel that you have read some of the information elsewhere, you are probably right because some articles have already appeared in a series of books called "Current Aspects of Computer Technology." There is a total of 34 articles which cover many of the ways in which computers affect our lives and each article is written by a relevant expert in the particular field and it is hard to pick out one article in particular because they are all very, very good. If you are unsure about computer applications in your field then this book should act as a very good reference guide. However, the point to remember here, is that the computer industry, because of its nature, is changing all the time and the changes come fast and furious. You can read articles on contemporary computing until you are blue in the face and still find that the best advice you can get is from computer users, experts and dealers. Obviously it is impossible for this book to tell you which system to choose, but as a general outline to computerisation, this book is well worth buying, reading and thoroughly understanding.

Title:	*Selected Essays in Contemporary Computing*
Price:	*£5.95*
Editor:	*Alan Simpson*
Publisher:	*Gower Publishing Company Limited*
Available from:	*Gower House, Croft Road, Aldershot, Hampshire GU11 3HR*
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UTILITY REVIEW.

Programmers Aids for the 64

This month we're taking a look at two of the more popular programmers aids for the Commodore 64, one brand new and one not so new.

Both these packages aim to make the programmers life simpler, and in their individual ways, both succeed. However, no-one is likely to want to buy both, so we'll examine each in turn.

To get the ball rolling:

Sysres 64

Available from Solidus International, at a cost of £59.00, Sysres comes on an intriguingly protected disk.

The master disk will allow you to make three working copies of the program, and no more. This is working on the theory that three will be enough to cover any mishaps, but is NOT enough to encourage you to give them away.

A sound idea, and one that other software suppliers ought to take note of. So often, when the master protected disk has somehow become corrupted, it has to be sent back to the manufacturer for repair, thus depriving you of your system for a few days.

This way, you should never be without a working version of Sysres.

Getting Started

You can not use Sysres until you've taken at least one copy of it, so as well as buying it, you'll also have to buy a few spare disks. You may resent this at first, as the copying process is very tedious on the single disk drive for the 64, and indeed you are advised to seek out a friend with a dual disk drive and a suitable interface.

But note, Interpod (from Oxford Computer Systems) is NOT a suitable interface! Sysres will not work with this product, so you'll need something like DAMS IEEE cartridge.

However, once you've made a copy you can relax in the secure knowledge that you now have a safe, backup version of the master disk.

After this initial session Sysres can be loaded like any other program, and as it sits below the start of Basic you lose none of your precious memory (apart from a miserly 256 bytes!). It can, if required, be loaded 'over the top of' an existing program, so as not to disturb that program and still leave it sitting in memory.

Once loaded and initialised, Sysres adds an impressive array of commands to your computing armoury.

In Use

None of these can be used in a program, as they are all intended as programmers aids, both in writing and in debugging a program.

However, it does mean that a program developed using Sysres can be transported to other 64s, without the owners of those other computers also having to buy the package.

Some of the commands added, will be familiar to all owners of toolkits and other utilities: auto, block delete, find (with change if required), renumber, trace, variable dump, and so on, but Sysres offers a lot more besides.

The most immediately obvious addition is the ability to scroll a program listing in both directions! In other words, by moving the cursor up to the top of the screen, whilst displaying a program listing, you can see previous lines of the program. You can continue on back through the program, until you reach the very first line.

This feature also works, whilst in the monitor, thus allowing you to see lines of a Basic program without coming out of the monitor.

'In the Monitor'? On a Commodore 64? As well as supplying you with Sysres, Solidus have put a few more programs on the disk, including a version of the public domain program Extramon, specially adapted for use with the 64, and this can be used whether or not you've got Sysres loaded into the computer.

This program not only gives you a machine language monitor, but also an assembler, disassembler, quick step etc. Almost worth the price by itself!

Other useful features, rather than actual commands, include a screen dump achieved by just pressing two keys. This suspends program operation and immediately dumps the contents of the screen onto a Vic printer.

Added Commands

Dos Support is another feature much beloved by PET enthusiasts, and in light of Commodore's decision to only equip the 64 with Basic 2.0, it becomes doubly invaluable.

Essentially any disk command can be sent in, in short hand form, provided it is proceeded by the '@' symbol. Thus @10 becomes initialise drive 0, @ on its own reads the error channel, and so on. This also makes it possible to read the disk directory without losing the program currently sitting in memory: a very useful addition.

All told there are something like 50 new commands to make programming easier, but some of these are only extensions to existing commands, albeit useful ones.

Load and Save now default to the disk drive, Run ignores any garbage printed on the screen (the world famous RUNDY. command!), Close, closes one or all of the files that are open at the time, and CMD no longer sends a Ready. down the line.

On top of these, Bload and Brun allow the loading and executing of machine language files. So what else can you do?

There are a number of commands that we haven't covered yet, and to go into each one in detail would take up far more room than we actually have available for this review!

But, some of the other commands include OLD, which restores a program after an accidental NEW; WHY, which prints in reverse field, the command being executed when a program fails through some kind of error; Append and Merge, which respectively add a file to the end of an existing one and merge a file into one already residing in memory; KEY, which defines a key as a special function (be it a Basic keyword, a subroutine, a short program listing, or whatever), and many more besides.

Conclusion

A comprehensive and extremely useful

UTILITY REVIEW.

set of additional commands for anyone who intends using their Commodore 64 at all seriously.

In particular the bi-directional scrolling is a godsend, and FIND speeds up program development considerably. The addition of Extramon for the 64 is the ideal finishing touch to a fine piece of software.

Well written and well packaged, at £59.00 Sysres is worth every penny.

Area:	*Programmers Aid*
Product:	*Sysres 64*
Price:	*£59.00*
Configuration:	*Commodore 64, Disk Drive (with optional printer)*
Company:	*Solidus International Corporation (UK) Ltd*
Address:	*Mill House, Wandle Road, Beddington, Croydon CR0 4SD*
Tel:	*01-688 5164*

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- DUMP
- EXEC
- FIND
- GET
- KEY / KEYS
- KILL / KILL*
- LIST
- LOAD
- MERGE
- MON
- OLD
- PUT
- RENUMBER
- RUN
- SAVE
- SETD
- SETP
- TRACE
- VERIFY
- WHY / WHY?

Power 64

Although we took a brief look at this in our April issue, it's worth devoting a few more words to it, in light of the arrival of Sysres.

Power similarly comes on a protected disk, but this one doesn't allow you to make any copies of it, thus rendering your system inoperable if something should go wrong with the disk.

As a program it takes up considerably more room in the 64 than Sysres does, and you lose about 10K in total. Is it worth the loss?

In Use

The first thing that you'll notice about Power, is that it too, gives you bi-directional scrolling, operating in exactly the same way as Sysres. The manual (written by Jim Butterfield) makes great play about this, and, as in the rest of the manual, this section is littered with awful jokes.

Jim may know a lot about computers, but one can't help wishing that he'd keep his sense of humour out of computer manuals.

Apart from this, the rest of Power consists mainly of familiar commands, without the addition of a monitor. Instead you're recommended to buy a program called PAL, produced (and written) by the people who gave us Power.

Find, Change, Renumber, Auto, Block Delete and Trace are all there, as well as the ability to define a single key to produce Basic keywords and/or sub routines, again like Sysres.

There are a number of other commands as well, including resetting of Basic pointers, if you've been doing something untoward, but a total of 14 commands is a little low when compared with Sysres.

More Power

However, there have been extensions made to the original version of Power, and these make it an altogether more interesting package.

Called MorePower, this extra program comes on the same disk as Power itself, for no extra charge, and there is the possibility that more and more commands will be added to the system and made available with the basic package. Whether existing users will get these commands or not is unclear, but we feel they should take this point up with their supplier.

The chief attraction of MorePower is that it will allow you to look at a listing of a program stored on disk, without disturbing the program currently in memory. Thus selective merging becomes possible by looking at a short piece of the program at a time, and just hitting return, over the lines as they appear on the screen.

Two programs can also co-exist in memory, as the system can set aside one portion of memory for one work area, and another for something else. This means that you can, for example, have a master program stored in one area of memory, and start altering it in another, looking back to the original to check various points. Very useful!

Conclusion

Despite the name, not as powerful as Sysres, and it is also £10 more expensive. The commands given are probably the ones that you'll use most often, but the lack of a monitor and the DOS Support commands is a shame.

The manual falls down also as an attempt to give you a serious guide to using Power and MorePower: that sort of humour deserves to be elsewhere, not in a software manual.

Sad to report, but Power has probably had its day, and Sysres will (no doubt temporarily) take over as the leading programmers aid for the Commodore 64.

Area:	*Programmers Aid*
Product:	*Power 64*
Price:	*£69.00*
Configuration:	*Commodore 64, Disk Drive*
Company:	*Kobra Micro Marketing*
Address:	*PO Box 28, Henley-on-Thames, Oxon RG9 1PF*
Tel:	*04912-2512*

APPLICATION STORY

Micros in the Sky

The computer industry has really taken off. Anybody seeing the mountains of micros and associated products currently on offer, should already be aware of this. For most of the smaller businesses in the aviation industry, buying a computer is a major expense, as a result, computer control is for them a subject that is still up in the air.

Apart from the larger airlines – Lockheed and Boeing were among the first to develop world-wide aviation systems which attracted many companies – the aviation industry has been reluctant to get involved in computing. Technology saw to it that computers became much more common and smaller in size, and this should prove to be a real boon to many small airlines.

The system known as Nav-log began its existence in the hands of a Dan-Air captain and was finally developed by Ian Beattie-Edwards, the Managing Director of Beattie-Edwards Aviation Ltd., who needed a small flight planning system. He approached Wego Computers Ltd, in Caterham to put the idea into practice. It is an 80 column system which runs on either the 8032 or 8096 with an 8050 disc drive and any compatible 132 column printer and although it works in the northern hemisphere because it accepts northern latitudes, all you have to do to change hemispheres is change latitudes. If there was any overriding principle in developing the system, it was to make flying much safer, reliable and accurate.

The system is dongle-ized and the first thing you must do to get the system operational is to enter the password or licence number which is supplied with the system. As soon as the program starts up, the user can either go into the maintenance section and change some of the variables or just go straight into the normal routine. The time is entered in Greenwich Mean Time followed by the date. It might be stating the obvious but one of the first important things you need to know is where you are going to and what type of aircraft you are getting there in. You will find this on the next screen, where there is a list of routes and analysis according to the type of plane used. If, in this example, we select the route called the Upper Amber 34, you will find that you can go to the French coast, Chartres, Amboise, Limoges, Barcelona . . . The aircraft has a series of characters by which it can be identified, the first two of which, identify the country.

The actual flight identification number consists of a letter, a dash and then any four other letters, for instance; S-CCIM. This does not bear any actual resemblance to the aircraft, but the operator in the control tower uses it for a radio call sign. This series of characters is then followed by the name of the flight captain and, because we are dealing with the flight of a particular aircraft – the aircraft parameters – like the head of the aircraft and the weight of the aircraft. The difficulty here is to contain enough information as possible, to memorise the aircraft's performance. Then there is the aircraft registration. If you key in an aircraft that is not recognised by the system all you have to do, is set new parameters. Should you hit the escape key by mistake, the computer throws up a random number and if the user does not come up with the corresponding number then the screen carries on – an original safety device that is designed to make the system idiot-proof. The route is actually selected by keying in the required numbers and letters, and the editor routine is put into motion by hitting the return key, which should display the start and finish points. These consist of either three or four figures. To the pilots, Heathrow is known as EGLL and Gatwick as EGKK. It is also important to record the estimated flying time, the level of flight and the SID which is the distance of and time between the airport runway and the actual airplane. So far, all the information that has gone into the system has been data which is unlikely to change.

Should something go wrong during the actual flight and the pilot needs to know where to land in an emergency, he needs to know all the possible alternative destinations which are called the en-route alternatives and any relevant information which could affect the pilot's final choice of alternative destinations. Flying from Gatwick to Lepa Palma, Toulouse is an ideal en-route alternative, if the airport is not covered with fog and it is not a weekend when the airport is closed due to French military activity. The weather is the main cause of any change in flight and the pilot can keep up to date on this subject by recording information issued by the Meteorological Office every six hours. Once this time period has elapsed, the information automatically becomes invalid and is wiped out.

To print out a route report, the computer will produce a finished flight plan in about three minutes, although this is subject to the type of printer used. If the route to be typed in has only just been created, the final output should take about one minute longer. However, should you decide to opt out of the system without printing, the system always assumes that you do not want to print, and all you have to do is complete the random number device correctly. When you have been through the entire system this number device offers your last chance of escape before you are committed to print.

The whole system is based around a data base system with all the files linked together by chain prints. The keys are looked at by hashing on a key field, so that what is input on the screen is converted to a number. To save space on the system, the files obtain prints, so that if you have to change one variable, all the other details are updated. The printing characters are stored in ASCII but most of the data is in binary. Although each comes with two diskettes the system runs on only one drive. This is definitely a good system and one well worth looking at if you operate a small airline.

Area:	*Flight Planning*
Company:	*Wego Computers Ltd*
Address:	*22a High Street,* *Caterham, Surrey CR3 5UA*
Tel:	*0883 49235*

Example displays for flight information maintenance.

```
NAV-LOG MAINTENANCE                                                      11:20 / 19-05-83
-------------------------------------------------------------------------------------------
WAYPOINT DATA                                                               CONTROL
                                                                            P
                                                                             Store Data
                                                                             Print
                                                                             Escape


                    CODING  BIG

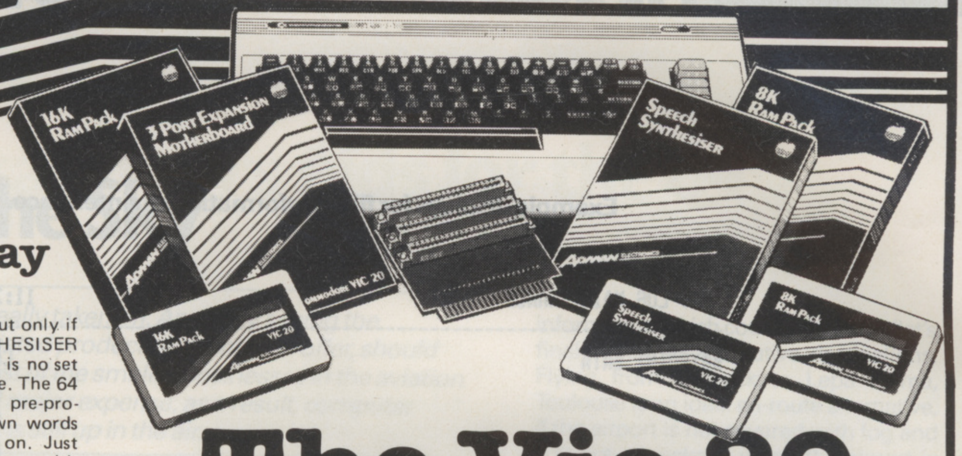
                       NAME  BIGGIN    }- This field may be used for FIR boundary
                                          information   eg EGTT/EINN.

                       FREQ  115.1     }
                                       }- For 5 fig waypoints these fields can be
                      IDENT  BIG       }  used for R NAV data   eg 270/25 BIG.
-------------------------------------------------------------------------------------------

                           DEG  MIN                               DEG  MIN
          -----------------------------------              ----------------------
          COORDINATES  {   51  19.8  N                 MAG.VAR   6  30  W E/W
                       {
                       {    0   2.2  E E/W
```

```
NAV-LOG MAINTENANCE                                                      11:28 / 19-05-83
-------------------------------------------------------------------------------------------
                                                                            CONTROL
                                                                            P
                                                                             Store Data
A/C REGISTRATION   G-IMBE                                      (see note)   Alternate
            TYPE   PA31                                                      Print
-------------------------------------------------------------------          Escape
                  MEAN        T.A.S.        CLIMB/DESCENT
                  FUEL        knots            RATES                        FUEL
-------------------------------------------------------------------         UNITS
       TAKE-OFF    20                                                       L
          CLIMB   150/hr       120           up     15 mins.                Kg
         CRUISE   120/hr       180           to  12000 ft.                  Pounds
        DESCENT    80/hr       160         down     10 mins.                Imp.gal
        LANDING    20                                                       U.S.gal
                                                                            Litres
-------------------------------------------------------------------------------------------
NOTE :-   To use ALTERNATE aircraft data from an existing aircraft on file you
          may input into the TYPE field the existing aircraft type, press <HOME>
          to return to the control square then take the A option. The chosen
          aircraft data will be displayed and can be modified  as required to
          create the new aircraft record.
```

ADMAN ELECTRONICS



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Address ______________________

____

CC/7/83

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Torg
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Protector
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Gridrunner
Cartridge for Commodore 64
Shamus
Aggressor
Cartridge for VIC 20
Sidewinder

VIC20

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Datestones Of Ryn (+16K)	-C-KK13P£13.80
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Games Pack 2 contains Laser Blitz, Maze of Mikor, Pinball, Tank Trap	-C-KK35Q-£13.95
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APPLICATION STORY

Sample route sheet from Biggin to Palma.

```
!    "NAV-LOG"             !Note: ENROUTE ALTERNATE   TOULOUSE         !Note: WEEK DAY ROUTING ONLY.           Issue:NAV-RO-MNG/82 !
!Messenger Newspaper Group !From ! EGKB BIGGIN        !SID   10        !On  Chocks    !Landing Time  !ATIS      MHz!Wx             !
!FLIGHT Ident  DEMO        !Elev.!  600 ft  21 mB dif!                 !              !              !Rwy          !               !
!A/C     !Capt.            !To.  ! LEPA PALMA         !STAR   4        !Off Chocks    !Take-off Time !W/V     /    !QNH            !
!G-1MBE  !I.BEATTIE-EDWARDS!Elev.!   13 ft   0 mB dif!                 !              !              !Vis         m!QFE            !
!Date    !F/O              !Via 1! UA34+UB31+ALT: 819!Scheduled Time   !Total Time    !Flight Time   !Temp         !Pax-           !
!19-05-83!                 !                         !                 !              !              !T/A          !Frt-           !
! Coordinates  ! WP!A/Way!Locn.!  Name   !Freq.! ID! MSA!F/L!Mag!Mag!ACT!Dst!Leg Time!  E T A  !ATA !R/T ! Departure Clearance:    !
!N51192 E000020!   !     !EGKB !BIGGIN   !     !   !    !   !Trk!Hdg!HDG!n.m!S/A Corr!Plan!Rev !    !Freq!                         !
!N51198 E000022!   !TMA  !BIG  !BIGGIN   !115.1!BIG!  24!   !018!SID!   ! 10!  3!  3 !    !    !    !    !                         !
!              !   !T.O.C!     !         !     !   !    !   !   !   !   !   !   !    !    !    !    !    !                         !
!N50271 E000007!   !TMA  !PEA  !ECHO ALPA!-----!---!  30!   !187!187!   ! 53! 20! 22 !    !    !    !    !                         !
!N50058 W000045!   !A34E !PEB  !ECHO BRAV!---  !-- !  30!   !195!194!   ! 22!  7!  8 !    !    !    !    !                         !
!N49426 E000139!   !UA34 !ETRAT!COAST    !-----!---!  30!   !159!162!   ! 26!  9! 10 !    !    !    !    !                         !
!N48288 E000593!   !UA34 !CHW  !CHARTRES !1145.!CHW!  30!   !163!166!   ! 80! 27! 30 !    !    !    !    !                         !
!N47257 E001039!   !UA34 !AMB  !AMBOISE  !113.7!AMB!  30!   !182!183!   ! 63! 21! 24 !    !    !    !    !                         !
!N45490 W001016!   !UA34 !LMG  !LIMOGES  !114.5!LMG!  43!   !227!222!   !130! 43! 47 !    !    !    !    !                         !
!N43572 E001495!   !UA34 !GAI  !GAILLAC  !115.8!GAI!  43!   !137!142!   !165! 55! 60 !    !    !    !    !                         !
!N42223 E001590!   !UA34 !PUMAL!LFFF/LECB!-----!---! 124!   !179!180!   ! 95! 32! 36 !    !    !    !    !                         !
!N41177 E002051!   !UA34 !QUV  !BARCELONA!114.3!QUV! 124!   !180!180!   ! 65! 22! 24 !    !    !    !    !                         !
!N40100 E002290!   !UA34 !LISA !45D/MJV  !113.3!---!  40!   !168!170!   ! 70! 23! 26 !    !    !    !    !                         !
!              !   !T.O.D!     !         !     !   !    !   !   !   !   !   !   !    !    !    !    !    !                         !
!N39359 E002493!   !UA34 !PA   !PALMA LOC!307.5!PA !  40!   !158!159!   ! 37! 13! 14 !    !    !    !    !                         !
!N39331 E002437!   !     !LEPA !PALMA    !     !   !  55!   !241!STA!   !  4!  1!  1 !    !    !    !    !                         !
!              !   !     !     !         !     !   !    !   !   !   !   !   !   !    !    !    !    !    !                         !
!              !   !     !     !         !     !   !    !   !   !   !   !   !   !    !    !    !    !    !                         !
!              !   !     !     !         !     !   !    !   !   !   !   !   !   !    !    !    !    !    !                         !
!              !   !     !     !         !     !   !    !   !   !   !   !   !   !    !    !    !    !    !                         !
!              !   !     !     !         !     !   !    !   !   !   !   !   !   !    !    !    !    !    !                         !
!              !   !     !     !         !     !   !    !   !   !   !   !   !   !    !    !    !    !    !                         !
!              !   !     !     !         !     !   !    !   !   !   !   !   !   !    !    !    !    !    !                         !
!              !   !     !     !         !     !   !    !   !   !   !   !   !   !    !    !    !    !    !-----LANDING DATA--------!
!              !   !     !     !         !     !   !    !   !   !   !   !   !   !    !    !    !    !    !ATIS   MHz!Temp          !
!              !   !     !     !         !     !   !    !   !   !   !   !   !   !    !    !    !    !    !RW        !QNH           !
!              !   !     !     !         !     !   !    !   !   !   !   !   !   !    !    !    !    !    !W/V   /   !QFE           !
!              !   !     !     !         !     !   !    !   !   !   !   !   !   !    !    !    !    !    !Vis      m!T/L         ft!
!              !   !     !     !         !     !   !    !   !   !   !   !   !   !    !    !    !    !    !Wx                       !
!              !   !     !     !         !     !   !    !   !   !   !   !   !   !    !    !    !    !    !---------MINIMA----------!
!              !   !     !     !         !     !   !    !   !   !   !   !   !   !    !    !    !    !    !R/W         !            !
!              !   !     !     !         !     !   !    !   !   !   !   !   !   !    !    !    !    !    !ILS         !            !
!              !   !     !     !         !     !   !    !   !   !   !   !   !   !    !    !    !    !    !No G/P      !            !
!              !   !     !     !         !     !   !    !   !   !   !   !   !   !    !    !    !    !    !NDB         !            !
!              !   !     !     !         !     !   !    !   !   !   !   !   !   !    !    !    !    !    !PAR/SRE     !            !
!              !   !     !     !         !     !   !    !   !   !   !   !   !   !    !    !    !    !    !-------------------------!
!              !   !     !     !         !     !   !    !   !   !   !   !   !   !    !    !    !    !    !ZFW        TOW           !
!              !   !     !     !         !     !   !    !   !   !   !   !   !   !    !    !    !    !    !Fuel remaining    !      !
!              !   !     !     !         !     !   !    !   !   !   !   !   !   !    !    !    !    !    !-------------------------!
!PLAN ROUTE!           ! FUEL CALCULATIONS      Units: LITRES     !Time !                                ! Cruise F/F   120 /Hr    !
!MSA       !  124      !   ! TAS!  W/V  ! W/C!A!Flt.Fuel !        !  :  !---------HOLD  FUEL-------------!  . at F/L    120        !
!Mn.Mag.Var!   -5      !Cli! 120! 160/10! -10!B!  + 5%   !        !**:**! DIVERSION   1 !     2 !     3  ! En Route ALT 1 !   2    !
!Mn.Trk.(T)!  171      !Cru! 180! 180/20! -20!C!Diversion!        !  :  ! !A/F  !  LEIB !  LEBL !  LEMH  ! Airfield !     !        !
!Dist.(n.m)!  819      !  2!    !       !    !D!Holding  !        !  :  ! !MSA  !    55 !    68 !    55  ! Chk.Point!     !        !
!F/L       !  120      !  3!    !       !    !E!StartTaxi!        !**:**! !Tr(T)!   237 !   344 !   156  ! Trk.(T)  !     !        !
!                      !  4!    !       !    !F!Min.Ramp !        !  :  ! !Dist.!    90 !   145 !    90  ! Dest.dist!     !        !
!S/A Time  !  276      !  5!    !       !    !G!Extra    !        !  :  ! !W/V  ! 120/10! 120/10! 120/10 ! W/Comp   !     !        !
!Corr.Fuel !  647      !Des! 160!       !    !H!Tot.Ramp !        !  :  ! !W/C  !     5 !     7 !    -8 !M!Dest.Fuel!      !        !
!Corr.Time !  304      !Tot!    !       !    ! !Reserve  (C+D)          ! !EET  !       !       !      ! !FUEL TO CONTINUE         !
!          !           !Avg! 153!       ! -15! !Min.Divn.(C+J)          !J!Fuel !       !       !      ! !M+5%M+C+D!      !        !
!(C) 1982 Wego Computers Ltd.   Beattie-Edwards Aviation Ltd : 20 Normanhurst Close : Crawley : Sussex : Tel Crawley 20565 (24hr) !

!Volmet: Amsterdam 126.2: Bordeaux   126.4: Brussels 127.8: Dublin  127.0: Frankfurt 127.6: London M 135.375, S 128.6, N 126.6    !
!        Madrid    126.2: Marseilles 127.4: Paris     126.0: Seville 127.0: Vienna    126.0: Zurich   127.2                          !
!FIR RT: London E= 124.6, W= 124.75, N= 134.7: Scottish 133.2: Amsterdam 124.3,133.1: Brussels 126.9,122.5: Paris 124.1, 125.7:   !
```

A PERSONAL INFORMATION SYSTEM FOR THE 64

D
C
B
A
commodore
commodore

What is an information storage and retrieval system? It is a computerised card index program that will create, store, update and access data. The most obvious use for such a program is to keep records that need frequent access and regular updating. One could therefore use the program as a telephone or address book. It could also be used as a more serious data base (note the program will only hold a maximum of 356 date numbers). The idea was taken from a program by Commodore. Written entirely in Basic, the program is centered around seven different routines. These are the Update entry, Remove entry, Find entry, List all, Disk save, Tape save and End program. The operation of the program is achieved by an auto data statement generator, which actually creates and stores new data within the Basic program. This method is used in all of the routines to create new data and access data that already exist. Do not forget to SAVE the program after entering it and before RUNning it as it executes a cold start before exiting the program.

THE ROUTINES

Before describing the routines a word should be said about the Bytes free message given whenever the menu is accessed. Line 19 deals with the bytes free and checks to see if it is less than zero. If so, it calculates the true bytes free, by adding 2 to the power 16 to the number. This is a necessary calculation on the 64 as it will give a negative bytes free count if there is more than 32K or RAM available.

The first entry one might wish to use after Loading and running the program (or typing in and running the program), is the List all option. In the program we have included two Addresses and these will be displayed. To select any one of the options, one simply enters the first letter e.g. for List all type L. The List all routine starts at line number 66. Firstly it clears the screen, then restores the data and reads the data. This read actually sets up the Line number to read and continues to read until it reads an asterisk at which point the List all option is aborted as the asterisk marks the end. On line 68 X is set to equal PEEK(63)+PEEK(64)*256 which is the current data line number and CX stores the previous records starting line number. As one may see in this routine, addresses 63,64,65 and 66 are very important. Addresses 63 and 64 are the Current Data line number and 65 and 66 are the pointers to the Current Data item address.

Some of the other features of the List all option are; when the List all option is chosen, one needs to press the shift key to scan through the addresses. To return to the Menu before finishing the List option, press shift and the left arrow together. Line 70 scans for the shift key and Line 71 scans for the shift key and the left arrow. Line 72 prints the address and returns to scan for the next address or return to the Menu.

After choosing the Update/entry option the program does a bit of jumping around, firstly to Line 38 where it executes a gosub to Line 810. Line 810 is the Input routine and expects the user to enter a Date or an Address No. The Address No should be a numerical input, the date should be input in the form; 26jul1983. The month should be entered in lower case. The routine then does a check (lines 811-813) for legal or illegal entries, if an illegal entry is found the routine starts again. The return in line 813 takes the program back to line 38, which executes another gosub, this time to line 820. Line 820 checks Y and if Y = −1 then the entry was in the form of an Address No and not a Date and the routine returns to line 38.

Lines 821-826 is the date verification routine. This will validate a date and calculate the day as well as check that the inputs are within certain general limits. The day is calculated in W and W$ in line 822, the rest of the routine dissects the input date and gives it the correct suffix e.g. 'st', 'th' or 'rd'. The routine then exits back to line 38. If the input was originally numeric rather than an address, then the routine returns to line 38. In both cases the Address No or the Day and Date are printed on the screen and the program is awaiting the next entry.

The Update routine now jumps from line 39 to line 830. This line calculates the first line number of the record. Back to line 39 and C$ is reset and a gosub to line 840 is executed. Line 840 jumps to 850, then clears the data pointers, reads the first address and then searches through the Basic program until it either reaches corresponding line number and data, or there is no equivalent entry in which case the program awaits on a blank entry. At this point the existing entries can be altered or new entries can be made.

To exit the Update routine the user must enter the up arrow and press return, to print out the entry simply enter a '?' and press return. The routine now returns to line 840 where it pokes in the Line number and address before returning to line 40. Line 40-50 is a routine which displays any record previously there and updates the record. If any changes are made quotes are put up in front of the amended line. Lines 51-58 add the data into the program in lines with step numbers of one. Lines 59-61 are the print routine for the entries. This routine does not include updating the program, to do this one needs to update the record before printing.

Lines 62-65 remove a record, it displays the line numbers and necessary variables at the top left of the screen whilst erasing the record. Lines 73-81 save this program on disk. The routine initializes drive zero of unit 8 (disk drive usually), then checks for any errors, saves the program including any alterations and checks for errors again. If any errors are found it asks 'do you want to try to save again', otherwise the routine returns to the main menu. Lines 82-88 is the Tape Save, this routine saves the program on tape, waits for the user to rewind the tape and then verifies before returning to the menu.

Lines 89-110 is the find entry routine. Lines 89-90 ask for a key on the entry, the key must be from the start of any line in the record. Lines 91-96 search through the data for the key, if a * is found then it returns to the main menu as this is the end marker. Lines 97-99 display the record that the key was in. Lines 100-110 restore previous data line number and address number and search for further occurrences of the key.

Lines 29-37 is the End program routine. A check is made before ending the program that the program has been saved or if the user wishes to save the program. If the program needs to be saved the End routine is aborted and the program returns to the menu. If the user does not wish to save the program then a cold start is executed. This can easily be altered if so desired.

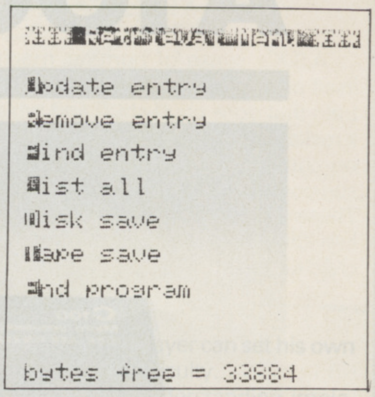
The program should be well suited for use in the home or possibly in the office, but care should be taken when entering and running the program as it accesses and enters new lines and data into its own data. Please let us know of the kinds of uses that you find for this program, whether they are unusual or as mentioned.

A PERSONAL INFO

```
 1 GOSUB900
 10 PRINT"⊐▤                      ▧*** —ETRIEVAL \ENU ***"
 11 PRINT"▩▩                      ▧/▦PDATE ENTRY"
 12 PRINT"▩                      ▧—▦EMOVE ENTRY"
 13 PRINT"▩                      ▧—▦IND ENTRY"
 14 PRINT"▩                      ▧└▦IST ALL"
 15 PRINT"▩                      ▧⊤▦ISK SAVE"
 16 PRINT"▩                      ▧|▦APE SAVE"
 17 PRINT"▩                      ▧⊤▦ND PROGRAM"
 18 PRINT"▩▩▩▩                     BYTES FREE =";
 19 IF FRE(0)<0 THEN PRINTFRE(0)+2↑16:GOTO 21
 20 PRINTFRE(0)
 21 GET AN$:IFAN$="" THEN 21
 22 IF AN$="U"THEN38
 23 IF AN$="R"THEN62
 24 IF AN$="F"THEN89
 25 IF AN$="L"THEN66
 26 IF AN$="D"THEN73
 27 IF AN$="T"THEN82
 28 IF AN$<>"E"THEN21
 29 PRINT"⊐ IAVE YOU TAKEN A COPY OF THE PROGRAM"
 30 GET AN$:IFAN$<>"Y"ANDAN$<>"N"THEN30
 31 IF AN$="N"THEN33
 32 PRINT"⊐ ND OF ⊤ROGRAM !!!":SYS64738
 33 PRINT"▩▩⊤O YOU WISH TO SAVE THE PROGRAM"
 34 GET AN$:IFAN$<>"Y"ANDAN$<>"N"THEN34
 35 IF AN$="N"THEN32
 36 PRINT"⊐—ETURN TO MENU"
 37 GOSUB800:GOTO10
 38 GOSUB810:GOSUB820:PRINT"⊐▩▩▩▩▧"AD$"▩"
 39 GOSUB830:C$="":GOSUB840
 40 FORV=0TO10:X$(V)="":NEXT:CH=0:POKE64,0:NL=0:IFC=4THEN43
 41 NL=NL+1
 42 IFX+10>(PEEK(63)+PEEK(64)*256)THENPRINTTAB(11)C$:X$(NL)=C$:READ C$:GOTO41
 43 PRINT"▤▩▩▩▩▩▩▩▩▩▩▩▩▩▩▩▩▩▩▩▩▩▩PRESS ‘↑’ AND RETURN FOR MENU▤"
 44 PRINT"⊐▩▩▩▩▩▩";:FORNN=1TO10:PRINTTAB(11);
 45 HH=PEEK(209)+PEEK(210)*256+PEEK(211):S=PEEK(HH)
 46 OPEN1,0:INPUT#1,C$:CLOSE1:PRINT
 47 IF LEFT$(C$,1)="↑"THENPOKEHH,S:GOTO51
 48 IF LEFT$(C$,1)="?"THENPOKEHH,S:GOTO59
 49 IF X$(NN)<>C$THENPRINTTAB(10)"⊐"CHR$(34):CH=1
 50 NEXT
 51 IF CH=0THEN10
 52 C=0:C1=1274
 53 IFC>10THENRUN
 54 IFPEEK(C1)<>34THENC=C+1:C1=C1+40:GOTO53
 55 PRINT"▤ X="X":C="C+1":C1="C1+40":GOTO53 "
 56 PRINT"▩▩▩▩":FORC2=0TOC:PRINT:NEXT
 57 PRINT"⊐              ▦▦▦▦▦▦▦▦"X+C"▦"TAB(6)"DATA⊐"
 58 POKE631,13:POKE632,19:POKE633,13:POKE198,3:SYS42140
 59 OPEN4,4:FORNN=1TO9:PRINT#4,"▩"X$(NN):NEXT
 61 PRINT#4:CLOSE4:GOTO10
 62 GOSUB810:GOSUB820:PRINT"⊐▩▩▩▩"AD$:GOSUB830:C=0
 63 IFC>9THENRUN
 64 PRINT"▤"X+C:PRINT"X="X":C="C+1":GOTO63"
 65 POKE631,19:POKE632,13:POKE633,13:POKE198,3:SYS42140
 66 PRINT"⊐":RESTORE:READXX$:CX=0
 67 READ XX$:IFXX$="*"THENGOSUB800:GOTO10
 68 X=PEEK(63)+PEEK(64)*256
 69 IFX>=CX+10THENCX=X:GOSUB860:GOSUB820:PRINT"▩▤"AD$"      ▩"
 70 IF(PEEK(653)AND1)=0THEN70
 71 IFPEEK(197)=57THENFORI=1TO1000:NEXT:GOTO10
 72 PRINTTAB(11)XX$:GOTO67
 73 PRINT"⊐▩▩⊤NSURE CORRECT DISK IS PLACED IN DRIVE  0 OF UNIT 8 AND PRESS ‘—3’
 74 GETAN$:IFAN$<>"▀"THEN74
 75 OPEN1,8,15,"I0":CLOSE1:GOSUB870:IFEN<>0 THEN78
 76 SAVE"@0:RETRIEVAL",8:GOSUB870
 77 IFEN=0THENPRINT"▩▩⊤ROGRAM SAVED OK":GOSUB800:GOTO10
 78 PRINT"▩"EN;EN$;ET;ES:PRINT"▩⊢O YOU WISH TO TRY TO SAVE AGAIN ?";
 79 GETAN$:IFAN$<>"Y"ANDAN$<>"N"THEN79
 80 IF AN$="Y" THEN73
```

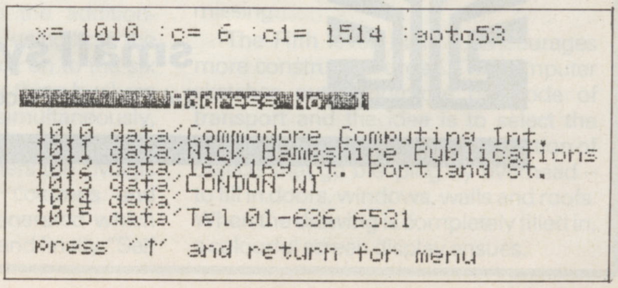
RMATION SYSTEM

```
81 GOTO 10
82 PRINT"⌐♥ET TAPE TO START AND HIT ´-3´"
83 GETAN$:IFAN$<>"▀"THEN83
84 SAVE"RETRIEVAL"
85 PRINT"▮┴EWIND TAPE AND HIT ´-3´"
86 GETAN$:IFAN$<>"▀"THEN86
87 VERIFY"RETRIEVAL"
88 PRINT"▮┤INISHED":GOSUB800:GOTO10
89 X=0:RESTORE:PRINT"⌐┤IND ¬NTRY ? ▮▮▮?▮";:
90 OPEN2,0:INPUT#2,AA$:CLOSE2:PRINT:READXX$
91 READ XX$:IFXX$="*"THENX=0:GOTO96
92 IFLEN(AA$)>LEN(XX$)THEN91
93 IFAA$<>LEFT$(XX$,LEN(AA$))THEN91
94 X=PEEK(63)+PEEK(64)*256:X=INT(X/10)*10:X1=X
95 GOSUB850:C=C+4:POKE66,INT(C/256):POKE65,(CAND255)
96 IFX=0THENGOSUB800:GOTO10
97 GOSUB860:GOSUB820:PRINT:PRINT"▮"AD$:PRINT
98 AX=PEEK(65)+PEEK(66)*256:READXX$:BX=PEEK(63)+PEEK(64)*256
99 IF BX<X1+10THENPRINTTAB(11)XX$:GOTO98
100 POKE64,INT(BX/256):POKE63,BX-INT(BX/256)*256
110 POKE66,INT(AX/256):POKE65,AX-INT(AX/256)*256:GOTO91
800 PRINT"▮▮            ▮⌐RESS ´-1´ TO CONTINUE▀"
801 GETAN$:IFAN$<>"▀"THEN801
802 RETURN
810 INPUT"⌐┐NTER DATE/ADDRESS NO.";C$:IFC$=""THEN810
811 DD=VAL(C$):LL=LEN(C$):IF LL>3 THEN 814
812 DD=VAL(C$):IFDD>365ORDD<1THEN810
813 Y=-1:M=1:RETURN
814 IFDD<1ORDD>31THEN810
815 Y=VAL(RIGHT$(C$,2)):IFY>0THENY=Y-Y0+1900
816 X=3+(DD<10):MM$=MID$(C$,X,3):FORM=1TO12:IFMM$=S$(M)THENRETURN
817 NEXT:GOTO 810
820 IFY=-1THENAD$="                         ♠DDRESS /O."+STR$(DD):RETURN
821 TT$="TH.":S=DD:X=Y+Y0:S=S+X*365:IFM=>3THENS=S-INT(M*F1+F2):X=X+1
822 S=S+INT(M*31+(X-1)/F):W=S-INT(S/7)*7:WD$=W$(W):MD$=M$(M)
823 IF DD=1ORDD=21ORDD=31THENTT$="ST."
824 IF DD=2ORDD=22THENTT$="ND."
825 IF DD=3ORDD=23THENTT$="RD."
826 AD$="   "+WD$+STR$(DD)+TT$+" "+MD$+STR$(Y+Y0):RETURN
830 X=INT(Y*T+T+M*1000+DD*10):RETURN
840 GOSUB850:C=C+4:POKE66,INT(C/256):POKE65,CAND255:IFC<>4THENREADC$
841 RETURN
850 RESTORE:READXX$:AD=PEEK(65)+PEEK(66)*256
851 AA=PEEK(AD+3)+PEEK(AD+4)*256:IFAA>XTHENC=0:RETURN
852 IFAA<>XTHENAD=PEEK(AD+1)+PEEK(AD+2)*256-1:GOTO851
853 C=AD+1:RETURN
860 X=X-T:Y=INT((X-1000)/T):M=INT((X-Y*T)/1000):DD=INT(((X-Y*T)-M*1000)/10)
861 IFY=-1THENDD=DD+(M-1)*HU
862 RETURN
870 OPEN1,8,15:INPUT#1,EN,EN$,ET,ES:CLOSE1:RETURN
900 X=0:HU=100:T=12000::F1=.4:F2=2.3:F=4
910 Y0=1983:DIMM$(12),S$(12):POKE53280,2:POKE53281,2:POKE53272,23
920 W$(0)="|UESDAY":W$(1)="OEDNESDAY":W$(2)="|HURSDAY":W$(3)="┤RIDAY"
930 W$(4)="♥ATURDAY":W$(5)="♥UNDAY":W$(6)="\ONDAY"
940 M$(1)="`ANUARY":M$(2)="┤EBRUARY":M$(3)="\ARCH":M$(4)="♠PRIL":M$(5)="\AY"
950 M$(6)="`UNE":M$(7)="`ULY":M$(8)="♠UGUST":M$(9)="♥EPTEMBER":M$(10)="ΓCTOBER"
960 M$(11)="/OVEMBER":M$(12)="¬ECEMBER"
970 S$(1)="JAN":S$(2)="FEB":S$(3)="MAR":S$(4)="APR":S$(5)="MAY":S$(6)="JUN"
980 S$(7)="JUL":S$(8)="AUG":S$(9)="SEP":S$(10)="OCT":S$(11)="NOV":S$(12)="DEC"
990 GOTO10
1000 DATA*
1010 DATA"¬OMMODORE ¬OMPUTING ⌐NT.
1011 DATA"/ICK |AMPSHIRE ⌐UBLICATIONS
1012 DATA"167/169 |T. ⌐ORTLAND ♥T.
1013 DATA"└┌/┬/ o1
1014 DATA"
1015 DATA"|EL 01-636 6531
19060 DATA"*********************
19061 DATA"*¬OMMODORE \AGAZINE*
19062 DATA"*********************
63999 DATA*
```



```
▮pdate entry
▮emove entry
▮ind entry
▮ist all
▮isk save
▮ape save
▮nd program


bytes free = 33884
```



```
x= 1010 :c= 6 :c1= 1514 :goto53

1010 data´Commodore Computing Int.
1011 data´Nick Hampshire Publications
1012 data´167/169 Gt. Portland St.
1013 data´LONDON W1
1014 data´
1015 data´Tel 01-636 6531
press ´↑´ and return for menu
```

A100.... ....C100

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On
Listen
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A100
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EDUCATING THE CHILDREN.

Last August we received Number Chaser Facemaker, We Want to Count and Twister and concluded that if they could keep up their professional standards, then it would be better for everyone. Have they managed to do this?

If you don't ask you won't find out: this has been the cry of teachers of all kinds down the centuries: a cry taken very much to heart by the people behind Applied Systems Knowledge – A.S.K. – who have built up a series of software programs for younger members of the family.

Educational software packages all too often play lip-service to the concept of nurturing young hearts and minds, before getting back to the true, immutable purpose of home computers – the destruction of advancing hordes of space invaders, munchymen and other colourful undesirables who inhabit the world of the visual display unit and probably form the real basis for the popularity of the home computer.

A.S.K. on the other hand – the Company was conceived by Professor Tom Stonier of the School of Science and Society at the University of Bradford – has assembled an impressive group of educational, graphics and programming experts to produce programs which reinforce and enhance what the child is learning elsewhere by creative and active involvement with the computer, whilst preserving an appealing "games-like" format.

The team of educational authors is co-ordinated by Dr. Michael Thorne, who plays the role of Consulting Editor. Currently a lecturer in the Department of Computing Mathematics at University College, Cardiff, he is one of the regional organizers for MUSE – Microcomputer Users in Education, in addition to being well known as a presenter of Thames TV's Database programme.

Having kicked off last August with four programs for the VIC-20, their range now totals ten different items, the four latest releases being Words, Words, Words, Hide and Seek, Shape Up and Number Puzzler.

Number Puzzler designed by Michael Thorne is an intriguing exercise in addition and subtraction, based on the theme of noughts and crosses, the idea being as in Noughts and Crosses to complete a line vertically, horizontally or diagonally to win the game, playing either against the computer or a two handed option with a friend opponent. After loading, you are presented with three choices of routine: addition, subtraction and a combination of the two, followed by a choice in board size: a three by three grid or six by six.

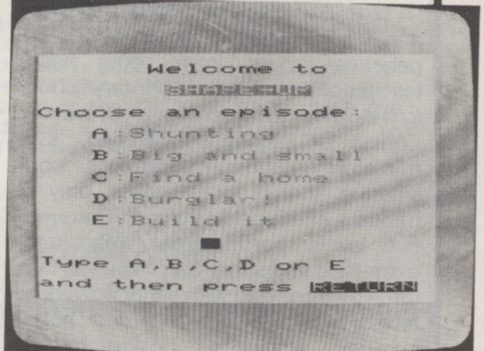
I tentatively took the three by three addition only option (the simplest) and was confronted by this grid

9	6	5
4	1	7
8	3	2

The computer then displayed two figures, in this case 5 and 2 in the left hand corner of the screen. I could then either use the 5 and 2 as they stood, or add them together to give the 7, given that it was an available option. Proceeding in this way and, as numbers became filled up by my opponent, the wily computer, I had to combine strategy with maths in order to win.

Making a game of it encourages kids to develop their numeracy almost without realising it. The game was certainly having that effect on me – and I was declared a lost cause in mathematics quite a few years ago! Soon I was being drawn into the game's more complex options: subtraction, where I was given only one number by the computer which I could either use as it stood, or could take two numbers on the grid, if they were available, whose difference it was; then the addition-subtraction combination, using both the above techniques. Thence on to the six by six option, where four three by three boards can be played simultaneously, having really to keep all my wits about me. Finally this game offers the "Magic Square", where rows, columns and diagonals have to be generated which add up to the same total and finally "Self Test" where each player can set his own limits of time and difficulty.

This is a very understanding implementation. Mis-keyings are borne with patience, and it waits for you to correct errors – very important to a child. There can be nothing worse than the sense of failure, especially when you know that, given a second chance, you would have got it right. As Professor Stonier says "Self confidence in one's own abilities is reinforced". The six by six version of the game looks a little daunting at first, but it is easily mastered.



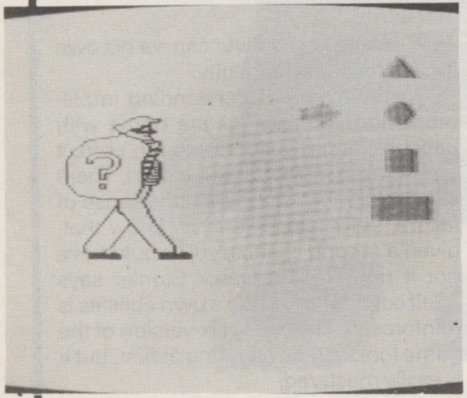
```
      Welcome to
       [illegible]
Choose an episode:
   A:Shunting
   B:Big and small
   C:Find a home
   D:Burglar!
   E:Build it

Type A,B,C,D or E
and then press RETURN
```

Shape Up, a program by Michael Holt, an ex-research physicist and well-known author of mathematics and science school text books is not a keep-fit course, but a game designed in five levels encouraging the younger user to distinguish between large and small and then to recognize various shapes and patterns, eventually graduating to using the shapes to build a variety of objects. Shape Up has some delightfully humorous touches – the fourth level, Burglar, stars a suspicious-looking character who "steals" one of the shapes displayed on the screen; the user has to identify afterwards which one is missing.

The Fifth level, Build It, encourages more constructive urges. The computer sketches out a domicile or mode of transport and the idea is to select the right shape and size – from a selection of objects that go bleeping by overhead – to fill in doors, windows, walls and roofs. When the drawing is completely filled in, a colourful screen display ensues.

A.S.K's sense of humour manifests itself once again here – there is a steam train that goes chuff-chuff and whistles, a rocket whose nose-cone blasts off, and on completing one of the houses, the sun comes out and birds start twittering. These unexpected little touches must inevitably help to amuse and maintain a child's interest.

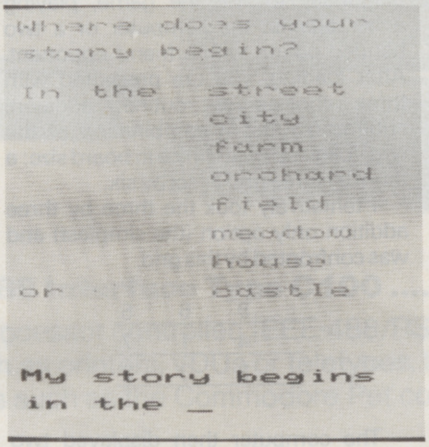


Hide and Seek by Gloria Callaway, another imaginative author whose experience ranges from being headteacher of a multi-ethnic primary school in Hackney to teaching a University Course in English in Sweden, is a miniature graphic masterpiece, considering the program takes only 2 minutes 45 seconds to load. There are five levels: hard, harder, very hard, extra-hard and super-hard. You will fill a three by three grid with either flowers or faces which include bearded social science students, bowler-hatted businessmen, clowns, suburban housewives, and Rastafarians. Once the boxes in the grid are filled with either the botanical or physiognomical options, Venetian blinds are drawn across them, and the computer challenges you to remember where a particular face or flower is.

It does this by means of a display in the bottom left-hand corner of the screen. By pressing the spacebar, you change the option and when you pick one, you press RETURN. The blind is raised and you discover the awful truth. The serious point of this educational game is that – again quoting Professor Stonier, "It improves short term memory and the ability to differentiate between symbols". This is a vital consideration for those who are learning to read – and they may not necessarily be children. Improving power of concentration can be important in the treatment of dyslexic adults. This game is, however, reckoned to be more generally applicable to the 5 – 12 year old age range.

The best of these programs have the kind of branching routines which ensure that a child is kept sufficiently uncertain of what will happen next to have one more go. Words, Words, Words, written by Professor Stonier is a good example of this, and programs of this quality, or those with the hypnotic elements of Number Chaser will make A.S.K. indispensable if they can keep up the good work.

Words, Words, Words was the program that I personally had most fun reviewing. It must have been quite a marathon of programming since it takes some 5.25 minutes to load and has a wealth of interesting little twists. "Where does your story begin?" queries the VIC.

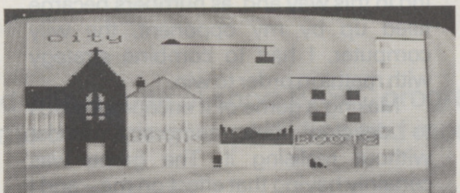


```
Where does your
story begin?

In the   street
         city
         farm
         orchard
         field
         meadow
         house
or       castle

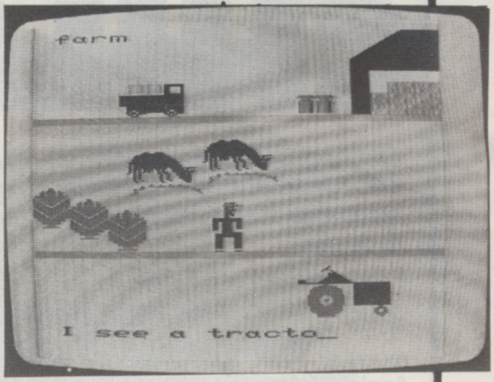

My story begins
in the _
```

It can begin in the street, in the city, on the farm, in the orchard, field, meadow or castle. Anxious to prove my street credibility I naturally typed in the first option. A picture of a house duly appeared, and the computer displayed the legend "I see a ..." It is down to you to supply the missing words – you have two goes. What is so pleasurable about this program is that one can actually see what things are meant to be. I rather tentatively typed in "pillar-box" at one point, expecting it to be a rather badly-drawn man, but no – it was a pillar box.



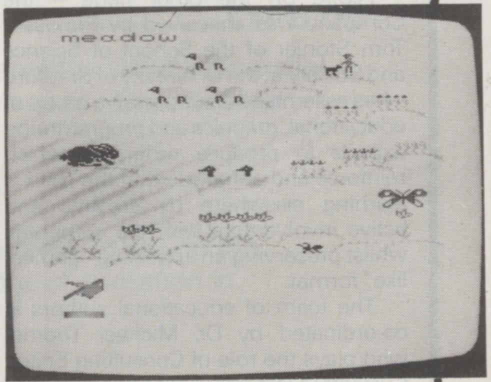
I see a _

Gradually by identifying the object and spelling it right, I build up a static scenario consisting of house, trees, clouds, a car, a bus, smoke from the chimney, and, of course, a pillar box.



I see a tracto_

Suddenly the whole picture comes to life, the smoke billows, the car drives off, and we are following the bus – by no means as obvious a bridge between routines as one sometimes encounters in more primitive implementations of Adventure games. "Where do you want the bus to go?" asks the computer. I chose the castle, and was duly rewarded by an eerie Gothic experience. The bus drops out of the story, and having been shown by the computer and typed in a star, a moon, a castle, walls, windows, an owl and a ghost, the picture once again sprang into action as the ghost glided ghoulishly along the battlements then adopted V/STOL mode and rose gracefully heavenwards to the accompaniment of creepy music. There is a punchline of sorts. "Where is the ghost going?" the computer enquires. As you sink slowly into philosophical meditation, a monstrous owl fills the screen. "Who knows?" it says inscrutably, and then winks leeringly. Whatever the theological implications of all this, it should give the kids a laugh, at the same time as teaching them to spell and identify objects.



I was rather less impressed by

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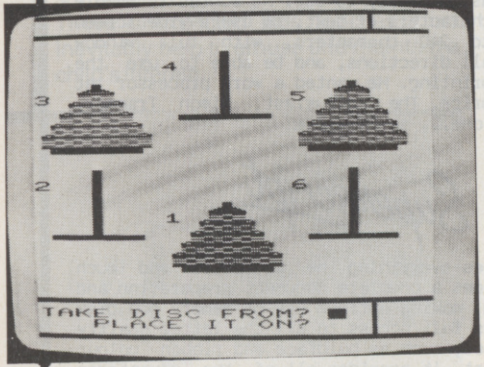
Rainbow Towers, but this may be because it is calculated to improve concentration and logical thinking via problem solving. I hate problems although many kids love them.



TAKE DISC FROM? ■
PLACE IT ON?

Rainbow Towers, Ian Stewart's second contribution is, as you may guess, an avatar of Hanoi Towers. There are six towers, of which three have discs on them. The idea is to move discs to the vacant towers. The various-sized discs change colour as they move, and you must conclude the game with each tower housing discs of only one colour, arranged in a particular sequence. By increasing the number of discs per tower from two to six, it is possible to render the game more complex as you get the hang of each level. This is likewise for eights and overs, and even adults are known to have been glued to their machines for long periods as they battle to get the last bits in place!

Finally, Number Gulper, again by Don Walton. This contains a gulper, a small creature which collects the coloured numbers from the maze-like display so that you can built the sum being shown on the screen. It is refreshing to think that even the noisy and voracious Pac-Man can be tamed and corralled in an educational mode. The program is meant to give children practice in all the four basic arithmetic operations – addition, subtraction, multiplication, and division. Success with Number Gulper means choosing one of these methods to make a number using only those numbers displayed on the screen: you have to choose the method which involves collecting the fewest coloured numbers.

Conclusions

All in all, these programs are worthy of the epithet "user-friendly". They display thoughtful implementation, originality and a sense of humour. The latter is especially useful in the education of young children and accordingly the government's MEP Organisation in Newcastle has reacted to the programs with enthusiasm.

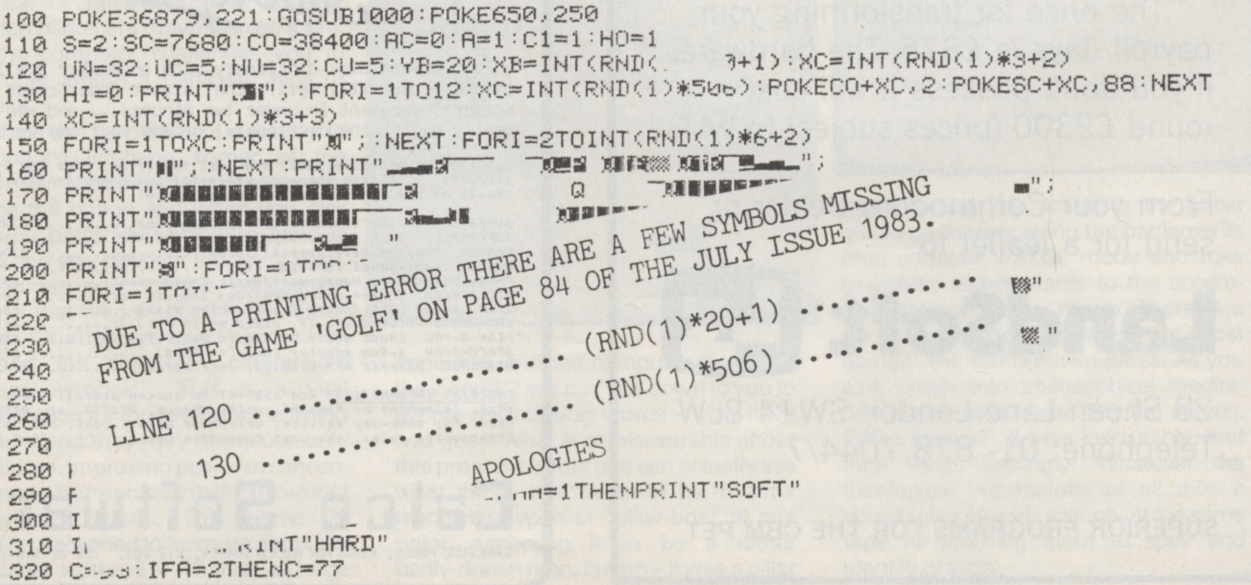
The programs are formatted so that, for the most part, if you can run one, you can run them all. Standard friendly symbols appear on all the programs to take the child to the next step or, when he makes a mistake, which quickly puts the user at ease and avoids frustration.

The disadvantage, for teachers, of these programs is that they are implemented on the VIC-20, which is not grant-eligible in the UK. However it is very popular abroad, and A.S.K make about 80 percent of their sales overseas. Versions are being developed for the BBC, Dragon, Spectrum, Texas Instruments and Atari machines and will be available shortly.

These cassettes cost £8.95 each (incl. V.A.T.) and are available direct from A.S.K, London House, 68 Upper Richmond Road, London SW15 2RP or selected dealers. Telephone 01-874 6046.

ERRATA

Golf : The instructions for golf are included in the program but here is a small description. You have a choice of 9 clubs to use and a choice of hard, medium, or soft hitting strength. The rest is obvious.



```
100 POKE36879,221:GOSUB1000:POKE650,250
110 S=2:SC=7680:CO=38400:AC=0:A=1:C1=1:HO=1
120 UN=32:UC=5:NU=32:CU=5:YB=20:XB=INT(RND(     9+1):XC=INT(RND(1)*3+2)
130 HI=0:PRINT"▀▌";:FORI=1TO12:XC=INT(RND(1)*5ub):POKECO+XC,2:POKESC+XC,88:NEXT
140 XC=INT(RND(1)*3+3)
150 FORI=1TOXC:PRINT"▒";:NEXT:FORI=2TOINT(RND(1)*6+2)
160 PRINT"▌";:NEXT:PRINT"▄▄▄▟▔▔▔▔  ▔▀▀▀ ▀▀▒▒ ▀▀▀▔▀▄▄▄";
170 PRINT"▒■■■■■■■■■■■■■■■■■▔▜             Q      ▔▀■■■■■■▀▀▀              ■";
180 PRINT"▒■■■■■■■■■■■■■■■▔▔▔▔  ▙▄▄▟■         ■■■▀▀
190 PRINT"▒■■■■■■■▔▔▔▔▔ ▙▄▟    "
200 PRINT"▒":FORI=1TO
210 FORI=1TO
220
230                                                            ▒"
240                                                          ▒"
250
260
270
280 I
290 F
300 I
310 I      RINT"HARD"
320 C=  :IFA=2THENC=77
330 IFA=3THENC=64
```

`   ...A=1THENPRINT"SOFT"`

DUE TO A PRINTING ERROR THERE ARE A FEW SYMBOLS MISSING
FROM THE GAME 'GOLF' ON PAGE 84 OF THE JULY ISSUE 1983.

LINE 120 .... (RND(1)*20+1) ....

130 .... (RND(1)*506) ....

APOLOGIES

NEW 64

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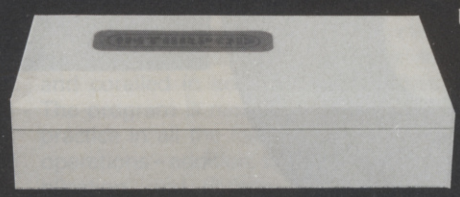

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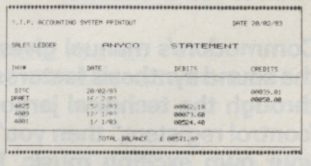

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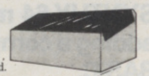

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SNIPPETS FOR THE 64

Interesting Pokes on the 64

Firstly this month a few small snippets for the 64. For those of you not yet acquainted with the 64, the command SYS(64738) is the cold start command, this seems to reset the machine and to a certain extent it does. Although the cold start command leaves any Machine Code programs in memory untouched, this can be very useful, it also helps you save wear and tear on your power switch. Another useful tip for the 64 that disables the LIST command, thus stopping easy access to programs. To disable the List command POKE 775,200, to enable POKE 775,167. This can be used inside programs which will disable the LIST command after the program has been RUN, or in direct mode. The POKE is to the Vector Basic text LIST.

The RUN/STOP key can be disabled on the 64 with: POKE 808,239 to re-enable the RUN/STOP POKE 808,237. To disable the RUN/STOP and the RESTORE keys: POKE 808,225, to re-enable POKE 808,235. When the RUN/STOP and RESTORE keys are disabled, your program listing will look strange, although it will still run and will be as normal when the keys are re-enabled.

There are many other pokes that may be used for fun or for more serious applications on the 64. For instance, one can disable the SAVE and LOAD routine, by placing the correct values into the SAVE and LOAD vectors. To disable the SAVE routine POKE 818,32, to re-enable the SAVE routine POKE 818,237. To disable the LOAD routine POKE 816,32, to re-enable the LOAD routine POKE 816,165. To disable the keyboard POKE 649,0 and to re-enable 649,10. One of the uses that a combination of these POKE's could be put to, is to protect programs from over anxious eyes.

There is still yet another interesting aspect that appeared whilst testing the above POKE's. One may, of course, produce a cold start in the usual way SYS(64738), but you may have hidden inside your program a cold start, for instance, POKE 770,226:POKE771,252, which will do a cold start and reset the machine. the POKE actually points the warm start vector to the cold start address (for the Vic POKE 770,34:POKE 771,253). This can also be done to the LOAD vector (POKE 816,226:POKE 817,252), the SAVE vector (POKE 818,226:POKE 819,252), the LIST vector (POKE 774,226:POKE 775,252) and any key press (POKE 655,226:POKE 656,252). Included this month, is a listing which incorporates most of the afore mentioned POKE's, thus it is totally self-defeating but worth studying perhaps, even trying to check we got it right?? SAVE it before you RUN it.

```
10 REM ** THIS PROGRAM WILL COMPLETELY
20 REM ** DISABLE THE 64, USING THE
30 REM ** POKE'S MENTIONED IN THE ARTICLE
40 REM ** LINE 50 DISABLES THE LIST COMMAND
50 POKE775,200
60 REM ** TO RE-ENABLE POKE 775,167
70 REM ** LINE 80 DISABLES THE RUN/STOP
80 POKE808,239
90 REM ** TO RE-ENABLE POKE 808,237
100 REM ** LINE 110 DISABLES THE RUN/STOP-RESTORE KEYS
110 POKE808,225
120 REM ** TO RE-ENABLE RUN/STOP-RESTORE POKE 808,235
130 REM ** LINE 140 DISABLES THE LOAD ROUTINE
140 POKE816,32
150 REM ** TO RE-ENABLE POKE 816,165
160 REM ** LINE 170 DISABLES THE SAVE ROUTINE
170 POKE818,32
180 REM ** TO RE-ENABLE THE SAVE ROUTINE POKE 818,237
190 REM ** LINE 200 DISABLES KEYBOARD
200 POKE649,0
210 REM ** TO RE-ENABLE KEYBOARD POKE 649,10
220 PRINT"■  YOU NOW HAVE NO KEYBOARD"
230 PRINT"▩▩▩▩BUT YOU CAN LIST THE PROGRAM!!"
235 FORP=1TO1000:NEXT
240 POKE649,10:POKE808,237:POKE774,226:POKE775,252
READY.
```

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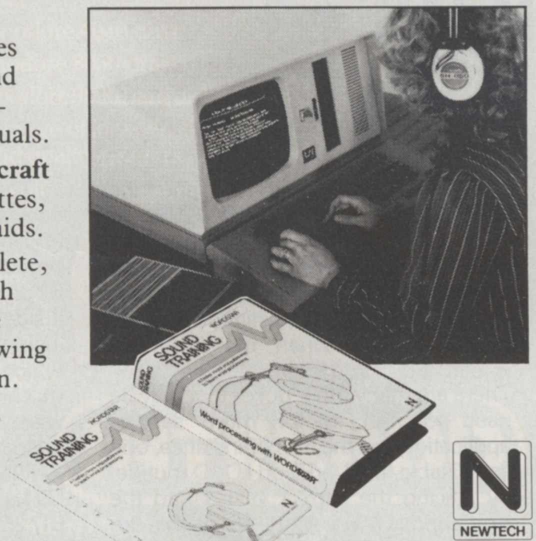

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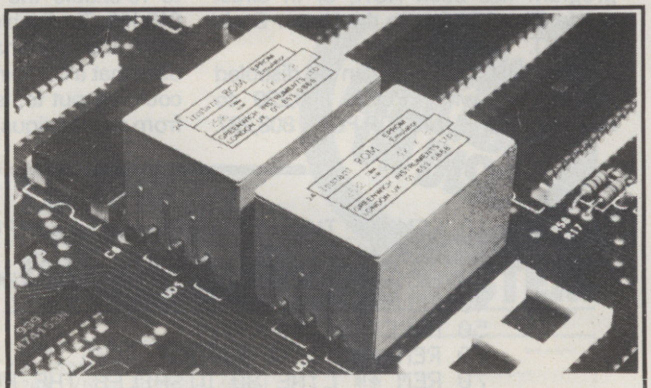

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HINTS & TIPS

Merging Programmes

The next routine is a technique described by Jim Butterfield, called Magic Merge (this technique works on both the 64 and the Vic). It allows the user to combine lines from one program with another. There are seven sections, or steps, they are:–

1) Insert a blank tape, rewind and then type:
   OPEN,1,1,1,"PROGRAM NAME":CMD1:LIST
   ("PROGRAM NAME" is the name of your program).
2. When the tape stops and the message 'READY' appears back on the screen, enter:
   PRINT#1:CLOSE1
3. After the tape stops you can remove it.

To merge with a program in memory the following steps are needed.

4. Put the Merge tape in the cassette unit and rewind the tape to the start.
5. Enter POKE 19,1:OPEN1
6. After the 'READY' message comes back, clear the screen with (SHIFT HOME).
7. Press exactly three cursors down.
8. Enter:
   PRINTCHR$(19):POKE 198,1:POKE 631,13:POKE 153,1
9. The tape will finally stop with an error message. Ignore the error and enter: CLOSE 1
10. The lines are now 'magically merged', have a look and see.

VIC Video

The 6522 Video Chip is the next stop for hints and tips, this is a very complex chip, perhaps the best place to start is with smooth scrolling. The control resisters are from $D000 – D02E HEX or 53248 – 53294 Decimal. Smooth scrolling is controlled in the horizontal direction with address 53265. Therefore, we can take away half of the top and half of the bottom line of the 64 screen with POKE 53265,19, to return to normal POKE 53265,27, which is the value usually in this address. Using this poke we can have a smooth scrolling routine of the bottom of the screen. It is also possible, although not so simple, to have a smooth vertical scroll on the 64. By POKE 53270,3 (this is the address of the Vic control register), we put the 64 into 38 row mode with a split column each side of the screen, and can now build a routine to do smooth vertical scrolling. So, if we use the formula FOR A = 8 TO 15:POKE 53270,A:NEXT, we will see the characters shift right. The possibilities using the 6522, for this particular application can be utilised in games, business, education or any other application.

The address mentioned above also has other functions, the most obvious is the regularly mentioned blanking of the screen. This is achieved with POKE 53265,11 and of course the screen can be put back with POKE 53265,27 the most obvious use for this is the use of the 1540 with the 64 (see June issue Hints and Tips). Extended colour mode can also be accessed with address 53265, POKE 3265,59 will put you into hi-res mode, but the character set is also visible at the bottom of the screen, and at the top of the screen is the page zero values, which will be visibly working away. What you are in fact seeing, is a bit map of RAM from 0 – 4096 as well as the character generator. Now clear the screen, and enter the following (you will have to type blind), FOR A =2880 TO 3839:POKE A,0:NEXTA, this should clear three lines of the high-res screen. Now enter this line FOR A = 2880 TO 3839:POKE A,255, this will fill three lines on the hi-res screen. This needs some experimenting with, to find out exactly what one can do and how we'll leave it for this month.

Another way of setting up and clearing the hi-res screen is with the following formula; POKE 53265, 29:POKE 53272,29:FOR I = 8192 TO 16191:POKE I,0:NEXT. The first POKE selects the hi-res bit map mode and the second POKE selects the RAM for the hi-res screen, the loop actually clears the hi-res screen. To get back to the normal screen enter POKE 53265,27:POKE 53272,21. A few small points about location 53272. It usually contains a value of 21, if this is changed to 22, the 64 is put into lower case mode (POKE 53272,22) to get back into upper case type POKE 53272,21. This location also selects the bit map mode as mentioned above.

Multi-colour Mode is entered through address 53270. If you enter POKE 53270,216 this will put you into Multi-colour Mode to get out of Multi-colour Mode POKE 53270,200. To get into Extended Colour Mode POKE 53265,91 and to return to Normal Mode POKE 53265,27. Included in this month's Hints and Tips, is a routine which selects Multi-colour Mode and switches between banks to set up two screens. Here is a brief break down of the routine:–

Line 5 jumps to Line 35. Line 10 sets all the bits to output in the 6522. Line 20 selects bank two. Line 30 redirects the character generator. Line 35 clears the normal screen, jumps back to line 10 and sets up a second screen in bank two, then clears the screen in bank two. Line 40 sets the background colour to yellow. Line 50 sets the border colour to red. Line 60 sets the second background colour to purple. Line 70 selects Multi-colour Mode. Line 90–120 prints a message. Line 130 waits for either f1, f2 or f3 to be pressed. Line 140 jumps to the routine to select normal screen if f3 is pressed. Line 145 exits the program if the f5 key is pressed. Line 150 jumps to the selection of bank two routine if the f1 key is pressed. Line 1000 selects the normal bank and line 1100 sets the character generator to point to that bank, but still in Multi-colour Mode. Line 1110 selects the two background and the border colours. Line 1120 – line 1150 prints a message. So a simple demonstration of Multi-colour Mode and bank selection, is not very useful as a routine, but only meant to demonstrate how to select multi-colour and the use of bank selection.

HINTS & TIPS

```
5 GOTO35
10 POKE56578,PEEK(56578)OR3
20 POKE56576,(PEEK(56576)AND252)OR1
30 POKE648,132:RETURN
35 PRINT"⊐":GOSUB10:PRINT"⊐"
40 POKE53281,7:REM SET BACKGROUND TO YELLOW
50 POKE53280,2:REM SET BORDER TO RED
60 POKE53282,4:REM SET BACKGROUND TWO TO PURPLE
70 POKE53270,PEEK(53270)OR16
90 PRINT"▓▓▓▓    THIS IS MULTI COLOUR MODE"
100 PRINT"▓▓▓    IN BANK TWO
110 PRINT"▓▓▓    TO SWITCH BETWEEN BANK 0 AND 2"
120 PRINT"▓▓▓    USE ´F3´ FOR 0 AND ´F1´ FOR 2"
130 GETA$:IFA$<>"■"ANDA$<>"▀"ANDA$<>"▐"THEN130
140 IFA$="▀"THENGOSUB 1000:GOTO130
145 IFA$="▐"THENPOKE56578,PEEK(56578)AND252:POKE648,4:POKE53270,200:PRINT"⊐":END
150 GOSUB35:GOTO130
1000 POKE56578,PEEK(56578)AND252
1100 POKE648,4:POKE53270,PEEK(53270)OR16
1110 POKE53282,2:POKE53280,3:POKE53281,12
1120 PRINT"⊐▓▓▓▓   THIS IS BANK 0"
1130 PRINT"▓▓▓▓   TO RETURN TO 2 PRESS ´F1´"
1140 PRINT"▓▓▓▓   OR TO EXIT PRESS ´F5´"
1150 RETURN
READY.
```

64 Function Keys

This version is not the one printed in the June issue, it is one sent in by a reader and has been printed, as it seemed more appropriate to give readers space. The reader's name is Robert E Sargent, of RAF Chicksands, Shefford, Beds, he says:–

"A one key function can be a great time saver when writing and debugging programs. Here is a program that allows you to assign your own values to the eight function keys.

Enter the program exactly as written, being particularly careful about the DATA statements. The DATA is a machine Code program that is POKE'd directly into memory. One missed number in the DATA could cause a SYSTEM lock up.

Once you've entered the program SAVE IT first, then RUN it. This could save you the trouble of entering the program a second time after losing the program. The program will only take a few seconds to execute. When the program has finished, this message will appear on the screen:

USE SYS 49152 FOR ACCESS

READY.

Typing SYS 49152 and pressing RETURN will start the program. Upon execution this message will appear on the screen:

F1=?

Enter the value or the string you wish to assign to F1, then press the return key.

```
10 PRINT"⊐"
20 PRINT"▓▓▓▓▓▓▓▓▓▓►►►►►►PROCESSING ´FUNCTION KEYS´
30 FORX=49152TO49415
40 READA:POKEX,A
50 NEXTX
60 PRINT"⊐▓▓▓▓▓▓▓▓▓▓▓►►►►►►►►►USE SYS 49152 FOR ACCESS
100 DATA169,0,170,157,0,194,157,0
110 DATA195,157,0,196,232,208,244,133
120 DATA251,169,194,133,252,169,49,133
130 DATA253,169,133,133,254,169,13,32
140 DATA210,255,169,70,32,210,255,165
150 DATA253,32,210,255,169,61,32,210
160 DATA255,169,63,32,210,255,32,207
170 DATA255,72,160,0,165,254,145,251
180 DATA104,32,133,192,201,13,240,17
190 DATA201,95,208,2,169,13,145,251
200 DATA32,133,192,32,207,255,76,68
210 DATA192,230,253,165,253,41,1,208
220 DATA10,24,165,254,105,4,133,254
230 DATA76,114,192,56,165,254,233,3
240 DATA133,254,165,253,201,57,48,165
250 DATA120,169,144,141,20,3,169,192
260 DATA141,21,3,88,96,166,251,224
270 DATA255,208,2,230,252,230,251,96
280 DATA165,197,197,254,240,58,201,3
290 DATA48,54,201,7,16,50,133,254
300 DATA201,3,208,3,24,105,4,24
310 DATA105,129,174,141,2,240,3,24
320 DATA105,4,133,253,160,0,169,194
330 DATA133,252,132,251,177,251,197,253
340 DATA240,19,200,208,247,230,252,165
350 DATA252,201,197,208,239,76,49,234
360 DATA133,254,76,49,234,200,208,8
370 DATA230,252,165,252,201,197,240,242
380 DATA177,251,201,13,208,10,230,198
390 DATA166,198,157,119,2,76,213,192
400 DATA201,0,240,222,201,133,48,7
410 DATA201,141,16,3,76,49,234,32
420 DATA210,255,76,213,192,0,0,0
```

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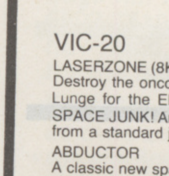

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HINTS & TIPS

You will receive a prompt for F2, F3 and so on, until all eight functions have a value. If no value is desired for a particular key, just press RETURN after the prompt and you will move on to the next function key.

There are a couple of features to this program that will make programming more pleasant. The first of these, is the LEFT ARROW key. When assigning values to the function keys, enter a LEFT ARROW for a CARRIAGE RETURN at the end of the line. Whenever this FUNCTION key is pressed, the function will automatically be executed.

The function key values can be changed at any time. However, there is a specific procedure for doing this. First, press the RUN/STOP and RESTORE keys. This resets the system pointer values. Then type SYS 49152 and the program cycle will begin again. Assigning new values to the function keys will in no way harm or disturb whatever program you are currently working on.

If you use RUN/STOP and RESTORE while working on a program, the function keys will stop working. There is a way of getting them back without using the reprogramming cycle. Using the direct mode, type:

POKE 788,144:POKE 789,192

Making sure both POKE's are on the same line. Now press RETURN. The function keys should now be working as you programmed them."

Our thanks to Mr. Sargent, for his worthy contribution.

VIC Colours

Included this month is a simple routine for the Vic colours, the routine uses the DEF FN instruction. Line 20 sets the DEF FN instruction, line 30 is the colour address, line 40 is the start of the loop for the background colours. Line 50 clears the screen and prints in white, line 60 prints in black if the background colour is not black. Line 70 prints the screen colour, line 80 is the start of the loop for the border colours. Line 90 POKE's the screen and border colours using the DEF FN instruction. Line 100 prints the border colour, line 110 is a delay loop line 120 and 130 close of the loops, line 140 puts back the original Vic screen and border colours. Line 150 clears the screen and prints in blue.

```
10 REM  COLOUR ROUTINE
20 DEF FNA(D)=D*16-8
30 S=36879
40 FORBA=1TO16
50 PRINT"☐▀";
60 IFBA>1THENPRINT"▓";
70 PRINT"SCREEN";BA
80 FORBC=0TO7
90 POKES,FNA(BA)+BC
100 PRINT"BORDER";BC
110 FORP=1TO500:NEXT
120 NEXT
130 NEXT
140 POKES,27
150 PRINT"☐▓";
200 END
READY.
```

Reserved words and the 64

The last routine for this month is for the 64, it allows the user to change all the reserved words. The program actually reads a copy of the BASIC ROM into RAM and allows the user to enter another word of the same length, but if the new word needs to be shorter, then the new word may be put inside quotes, for example: to change RETURN to TURN, enter "TURN". You may also switch the BASIC ROM in or out from direct mode whilst using this program. To switch BASIC ROM in POKE 1,55 to switch BASIC ROM out POKE 1,54. Now for a breakdown of the program:

There are many REM statements in the program for documentation purposes, these need not be typed in, but do not alter the line numbers. Line 20 – 40 copies the BASIC ROM into RAM behind the ROM. Line 60 switches out the BASIC ROM, line 80 is the input for the word to be changed. Line 100 sets R$ to the word

```
10 REM  LOOP TO COPY ROM INTO RAM, BEHIND ROM
20 FORA=40960TO49151
30 POKEA,PEEK(A)
40 NEXT
50 REM  TAKE OUT BASIC ROM
60 POKE1,54
70 REM  PUT RESERVED WORD INTO R$
80 INPUT"▓RESERVED WORD";R$
90 REM  SET TERMINATOR MARKER ON LAST BYTE OF STRING
100 R$=LEFT$(R$,LEN(R$)-1)+CHR$(ASC(RIGHT$(R$,1))+128)
110 REM ROUTINE TO SEARCH ROM FOR RESEVRED WORD
120 GOSUB290
130 IFF=0THENPRINT"☐▓▓          NOT FOUND":GOTO80
140 INPUT"YOUR WORD (SAME LENGTH)";N$
150 REM  CHECK LENGTH OF WORDS ARE THE SAME
160 IFLEN(N$)<>LEN(R$)THEN140
170 REM  ADD TERMINATOR
180 N$=LEFT$(N$,LEN(N$)-1)+CHR$(ASC(RIGHT$(N$,1))+128)
190 REM  LOOP TO POKE IN NEW WORD
200 FORJ=1TOLEN(N$)
210 POKEAD+J-1,ASC(MID$(N$,J,1))
220 NEXT
230 PRINT"☐▓▓▓▓▓     ANOTHER WORD (Y/N)"
240 GETA$:IFA$<>"Y"ANDA$<>"N"THEN240
250 IFA$="N"THENEND
260 REM  ANOTHER WORD
```

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to be changed plus the terminator. Line 120 jumps that search for the reserved word. Line 130 prints not found if the found flag is set. Line 140 INPUT's the new word, line 160 checks that both reserved and new words are the same length. Line 180 sets the new word with a line terminator. Line 200 – 220 is the loop to poke the new word in, 230 – 270 is the repeat or finish routine. Line 290 set the start address to the beginning of the BASIC ROM, line 310 sets C to the first character of the reserved word. Line 330 jumps to the routine to check the remaining characters of the reserved word, only if the first character is correct. Line 350 – 370 checks for the first character until it reaches the end of the reserved word table. Line 400 goes to the start of the check routine. Line 420 increments the start address by 1. Line 440 – 470 checks that all the characters match, if not, it carries on looking until it reaches the end of the reserved word table. Line 490 resets the start address and sets the found flag.

This routine will be fun to use and within additions, has unlimited number of possibilities. Until next month, please send your contributions for Hints and Tips to one of the programmers. Names and addresses are on the inside cover!!

```
270 GOTO80
280 REM  START ADDRES OF ROM
290 AD=40960
300 REM GET FIRST CHARACTER
310 C=ASC(MID$(R$,1,1))
320 REM IF FIRST CHAR. CHECK OTHERS
330 IFPEEK(AD)=CTHEN420
340 REM  LOOK AT NEXT ROM POSITION
350 AD=AD+1
360 REM  CHECK FOR END OF WORD TABLE IN ROM
370 IFAD=>42000THENF=0:RETURN
390 REM  STARTS NEXT CHECK
400 GOTO310
410 REM  SET POINTER TO POSITION OF SECOND CHAR.
420 AD=AD+1
430 REM  LOOP CHECK REST OF CHAR. MATCH
440 FORJ=2TOLEN(R$)
450 REM  CHECK EACH CHAR.
460 IFPEEK(AD+J-2)<>ASC(MID$(R$,J,1))THEN310
470 NEXT
480 REM  SET POINTER TO FIRST START OF WORD AND
 SET FOUND FLAG
490 AD=AD-1:F=-1
500 RETURN
READY.
```

Our readers are now due an apology for the Hints and Tips section in June. Firstly, on the routine to use the 1540 with the 64, the POKE's needed are POKE 53265,11 (turn screen off) and POKE 53265,27 (turn screen on). Next correction is in the INPUT routine, a line is missing, it is 45. The whole routine has been included again, with correction.

```
READY.

10 OPEN4,0:REM  OPEN KEY BOARD AS A DEVICE
20 PRINTCHR$(147);:REM  CLEAR SCREEN
30 DIMA$(100):REM  SET UP ARRAY FOR TEXT STORAGE
40 FORI=0TO100:REM  INPUT LOOP FOR TEXT
45 INPUT#4,A$(I)
50 PRINT:REM  SKIP TO START OF NEXT LINE
60 IFA$(I)=""THENI=100:REM  TEST FOR END OF PRINT LOOP
70 NEXT:REM  END OF INPUT LOOP
100 FORI=0TO100:REM  PRINTING OF TEXT LOOP
120 FORJ=1TOLEN(A$(I)):REM  LOOP FOR LENGTH OF STRING
130 B$=MID$(A$(I),J,1):REM  B$ = JTH CHARACTER FROM STRING
140 IFB$="!"THENPRINT:GOTO200
150 REM  DO CARRIAGE RETURN IF EXCLAMATION MARK
160 PRINTB$;:REM  CHARACTER OF TEXT LOOP
200 NEXT:NEXT:REM  CLOSE LOOPS
300 CLOSE4:REM  CLOSE KEYBOARD CHANNEL
400 END
```

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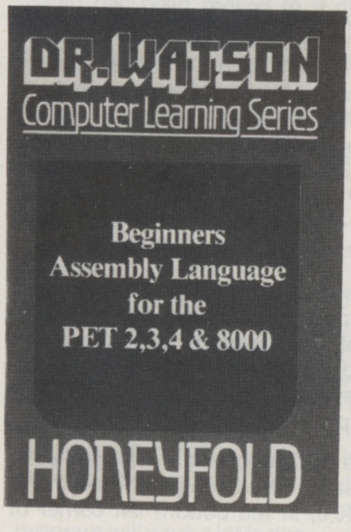
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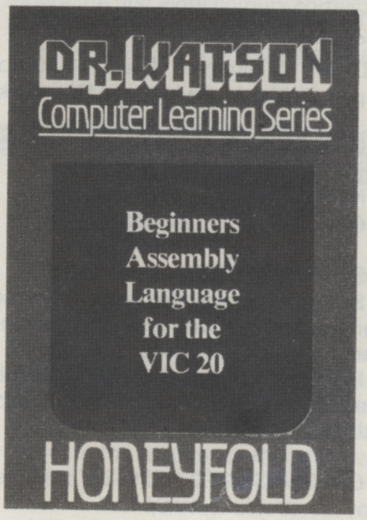
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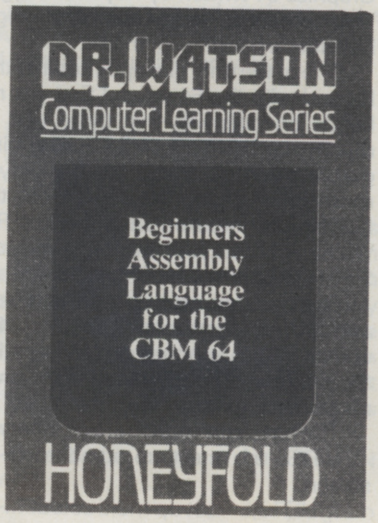
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SOUND & VISION

ROY'S 64 GRAPHICS PACKAGE

The Commodore 64 has superb Graphics capabilities, in this article we review a very comprehensive Graphics package – it adds 24 graphics commands to Basic.

This month we take a look at Screen Graphics-64 written by Roy Wainwright. This package is a complete High-Resolution package for the 64.

One of the only disappointments that I found with the 64 when I first got my hands on one was that there was so much user RAM available but no hires graphics commands. There is plenty of room for the graphics screen but this facility was not taken advantage of. Roy Wainwright has seen this and produced Screen Graphics-64.

The package sets up a hires screen and 24 hires commands for the 64. It comes with a manual explaining all of the commands, a demonstration program and a tutor program.

The hires commands are as follows:

HIRES a,b – set up standard hi-res screen.

MULTI a,b – set up multi colour hi-res screen.

With both of these, a = screen colour, and b = border colour.

TIC a,b,c, – mark the screen edge with points. a = X step, b = Y step, and c = colour of dots.

DOT x,y,c – plot a point at coordinates x,y with colour c.

DRAW x1,y1,x2,y2,c – draw a line between the two points x1,y1 and x2,y2 with colour c.

BOX x1,y1,x2,y2,c – draw a box where x1,y1 and x2,y2 are opposite corners of the box and c is the colour.

CIRCLE x,y,r,c – draw a circle with centre coordinates x,y, radius r, and colour c.

CHAR g,x,y,c,"str" – plot a string of characters on the screen with x,y the start position of the string, c the colour, "str" the string to be displayed, and g is the character set (1-4).

BLOCK x1,y1,x2,y2,c – fills a rectangular area of the screen with the colour c, the coordinates are as in BOX.

MODE a – set mode of display, a is either 0,1,or 2 for normal, erase, or reverse mode.

FILL x,y,c,e – fills an enclosed area of the screen where the point x,y is anywhere within the area, c is the colour and e is the 'paintbrush' (only required in multi mode).

PIXEL (x,y) – returns a value greater than 0 if the point is turned on.

These are all of the plotting commands.

There are two other sets of commands, screen control commands and Sprite control.

SCREEN CONTROL:

DUMP "filename" [,dev] – dump graphic display to device, tape (1) or disk (8).

GREAD "filename" [,dev] – read the graphic display from device.

NORM – switch to normal screen.

GRAPH – switch to hires screen.

SPRITE CONTROL:

Screen Graphics also helps the user manage Sprites with another 8 commands, these are:

BIT"1111111100000000011111111" – for a hires Sprite, the pattern may be coded with 21 lines as above.

COLOURS"012301230123" – as above for multi-colour Sprites.

SDATA"255,0,255,1,2,3,4,5,6,7,8,9" – another method of defining Sprites by giving the value of each byte.

HEX"FF00FF010203040506070809" – as SDATA but with hex values.

These four commands are treated as REM lines by basic and are by-passed.

When the Sprite has been defined as above, the next four commands may be used to manipulate the Sprite.

COPY a, 11111 – copy Sprite image defined starting at line 11111 into one of the 15 Sprite slot numbers (a=1 to 15).

SPRITE n,s,m,p,x,y,c1,c2,c3 – turn Sprite on.

n is the Sprite number (1-8),

s is the slot number that it was copied in to,

m is the multi-colour control (0 – single colour, 1 – multicolour),

p is the priority control of the Sprite with the background (0 – Sprite in front, 1 – Sprite behind),

x is the x expand (0 – normal, 1 – large x),

y is the y expand (0 – normal, 1 – large y),

c1 is the Sprite colour,

c2 and c3 are the other colours only needed for multicolour Sprites.

OFF n – turn off Sprite number n (1-8).

PLACE n,sx,sy – place Sprite n on the screen at coordinates sx,sy.

sx=graphic x+24,
sy=graphic y+6.

Apart from these commands, which may be used in direct mode or in a program, all four function keys have direct mode operations:

SHIFT F1 (F2) – Save screen. Followed by a prompt for filename,dev.

SHIFT F3 (F4) – Restore screen. Prompt as above.

These two routines are equivalent to DUMP and GREAD respectively.

F5 – Equivalent to NORM.

F7 – Equivalent to GRAPH.

These two may also be used whilst the program is running, but whenever any of the program commands are carried out, the Hires screen is automatically switched to so that whatever is being plotted can be seen.

The display format is arranged as in standard hi-resolution graphics with the origin(0,0) in the bottom left corner of the screen.

The plotting of the points with their respective colours is straight forward in standard Hi-res mode, but in multi colour mode, the colour of the point must have either 0, 100, or 200 added to it to specify the 'paintbrush' used.

With the CHAR command, in normal hires mode, the characters appear as normal character size but with a position resolution of 319 by 199. In multi colour mode, however, each character will appear on the screen four times its original size because of the fact that multi-colour points take up two bits of the bit map each. The double size in the y axis is just to make the characters look good on the screen. If the y size was normal the character would look like it had been flattened.

Earlier it was mentioned in the CHAR explanation the choice of four character sets, these are as follows:

1) Upper case letters and graphics characters,
2) Reverse upper case and graphics,
3) Lower case and upper case,
4) Reverse Lower case and upper case.

The package is loaded from tape and run. When run, all of the commands are added to the 64. The bottom of basic is then moved to start at $1D00 (7424) and the residing graphics routines are left below the bottom of basic.

When in graphics mode, bank 2 is selected so that the normal video screen is still as it was and the colour screen is taken from the equivalent video screen in the said bank.

Although all of the commands for normal basic are still available, the video screen has been moved to a different location. Instead of being from 1024 to 2023, the new video screen is from 35840 to 36839 but the colour screen is still at location 55296. This means that any programs written for the original 64 may easily be converted to work with Screen Graphics resident.

The colours used instead of being values 0-15 are instead values 1-16 where the first eight colours correspond to the keys on the keyboard. The other eight colours are the colours available with the commodore key and the number keys.

A final note about Screen Graphics is that there are only 25K bytes of basic RAM left once the package has been loaded. This is not really a problem considering that the Hi-res screen takes up 8K of memory.

This is a very good package and a must for anyone who wishes to use their 64 to its full graphics capacity.

Multi-Colour sketching for the 64

In the past few months, we have tried to cover most aspects of sound and vision on the 64.

Hi-res graphics principles have been explained for standard hi-res but only a small mention of multi-colour hi-res graphics. To rectify this, following this text is a program that allows the user to choose colours and plot with them using the cursor keys. This program is fairly slow as it is totally in basic, but using machine code plotting routines, the program will work a lot faster.

This program was not written as a utility but was written primarily to provide usable hires plotting routines for further use.

To use the program, is fairly simple but has to be mentioned as no text can be displayed on the screen. The first thing to do is to choose a colour for each of the 'paintbrushes', this is done by hitting the F1 key. The first of the blocks at the bottom will flash. To move the cursor to the required colour, use cursor right to move it right and cursor down to move it left. Having chosen the right colour, F3 will select that colour. The next keypress will be either 1, 2, or 3 which selects which brush to use.

Repeat this for the other two brushes and when you want to plot on the screen press the key P. To choose which brush to paint in, just hit the corresponding key (0 for unplot). Move the cursor with the corresponding cursor keys. If you wish to change the colours of the brushes, hit RETURN and repeat the process as above.

To exit the program hit RETURN again.

Please remember that this program is slow because of the fact that the point plotting is totally in basic.

```
READY.

1000 REM ****************************************
1010 REM * THIS PROGRAM IS A SKETCHING MULTI-   *
1020 REM * COLOUR PALLET. IT ALLOWS YOU TO PLOT *
1030 REM * POINTS ON TO THE SCREEN USING THE    *
1040 REM * CURSOR KEYS IN MULTI COLOUR MODE.    *
1050 REM * THERE ARE TWO SECTIONS OF THE PROGRAM*
1060 REM * THEY ARE AS FOLLOWS:                 *
1070 REM *   COMMAND SECTION: IN THIS SECTION,  *
1080 REM * THE USER CAN DEFINE WHICH COLOUR TO  *
1090 REM * WHICH 'PAINT BRUSH', EXIT PROGRAM, OR*
1100 REM * CHOOSE TO PLOT POINTS.               *
1110 REM *   DEFINE COLOURS IS SELECTED BY      *
1120 REM * PRESSING 'F1', MOVE THE CURSOR OVER  *
1130 REM * THE PALLET USING THE KEYS            *
1140 REM * CURSOR RIGHT TO MOVE IT TO THE RIGHT *
1150 REM * CURSOR DOWN  TO MOVE IT TO THE LEFT  *
1160 REM * WHEN THE CURSOR IS IN POSITION,      *
1170 REM * PRESSING 'F3' SELECTS THAT COLOUR.   *
1180 REM * THEN ONE OF KEYS 1,2,3 ARE PRESSED TO*
1190 REM * SET THAT COLOUR TO THAT BRUSH.       *
1200 REM *   THE SECOND SECTION IS THE PLOT     *
1210 REM *   TO PLOT POINTS, PRESS THE KEY 'P'  *
1220 REM * POINTS SECTION.
1230 REM * A BRUSH MAY BE SELECTED AT ANY TIME  *
1240 REM * BY PRESSING THE CPORRESPONDING KEY.  *
1250 REM * THE CURSOR KEYS MOVE THE HIRES CURSOR*
1260 REM * TO EXIT PLOT MODE, PRESS THE RETURN  *
1270 REM * KEY.                                 *
1280 REM *   TO EXIT THE PROGRAM COMPLTELY,     *
1290 REM * PRESS RETURN WHEN IN COMMAND MODE    *
1300 REM *                                      *
1310 REM ****************************************
```

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```
1320 INPUT"♥SCREEN COLOUR";N
1340 B=8192
1350 GOSUB 5000
1360 POKE53280,N:POKE53281,N:POKE53265,59:POKE53272,29:POKE53270,216
1370 DEFFNP(ZZ)=B+INT(X/8)*8+INT(Y/8)*320+(YAND7)
1380 DEFFNK(ZZ)=55296+INT(X/8)+INT(Y/8)*40
1390 GOSUB 1970:GOSUB 1870
1400 GETA$:IFA$=""THEN1400
1410 IF A$="■" THEN 1490
1420 IF A$=CHR$(13) THEN 1950
1430 IF A$="0" THEN BR=0
1440 IF A$="1" THEN BR=1
1450 IF A$="2" THEN BR=2
1460 IF A$="3" THEN BR=3
1470 IF A$="P" THEN 1670
1480 GOTO 1400
1490 I=0
1500 Y=192:X=I*16+40
1510 POKE FNK(0),N
1520 FOR J=1 TO 50
1530 GET A$:IF A$<>""THEN 1550
1540 NEXT J
1550 POKE FNK(0),I
1560 IF A$="⌧"THEN I=I-1
1570 IF A$="▐"THEN I=I+1
1580 IF A$="▬"THEN CL=I:POKE FNK(0),I:GOTO 1620
1590 IF I<0 THEN I=0
1600 IF I>15 THEN I=15
1610 GOTO 1500
1620 GET A$:IF A$="" THEN 1620
1630 IF A$="1" THEN COL(1)=CL
1640 IF A$="2" THEN COL(2)=CL
1650 IF A$="3" THEN COL(3)=CL
1660 GOSUB 1870:GOTO 1400
1670 X=XX:Y=YY
1680 GOSUB 10000
1690 GET A$
1700 ON BR+1 GOSUB 10000,11000,12000,13000
1710 IF A$="" THEN 1680
1720 IF A$="0" THEN BR=0:GOTO1680
1730 IF A$="1" THEN BR=1:GOTO1680
1740 IF A$="2" THEN BR=2:GOTO1680
1750 IF A$="3" THEN BR=3:GOTO1680
1760 IF A$="⌧" THEN Y=Y+1
1770 IF Y>183 THEN Y=183
1780 IF A$="]" THEN Y=Y-1
1790 IF Y<0 THEN Y=0
1800 IF A$="▐" THEN X=X+2
1810 IF X>319 THEN X=319
1820 IF A$="▌" THEN X=X-2
1830 IF X<0 THEN X=0
1840 IF A$=CHR$(13) THEN XX=X:YY=Y:GOTO 1400
1850 ON BR+1 GOSUB 10000,11000,12000,13000
1860 GOTO 1680
1870 FOR I=1 TO 3
1880 Y=184:X=16*I+48
1890 POKEFNK(0),COL(I)
1900 FOR J=0 TO 7
1910 POKEFNP(0),255
1920 Y=Y+1:NEXT J
1930 NEXT I
1940 RETURN
```

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```
1950 POKE53265,27:POKE53272,21
1960 POKE53270,200:POKE53281,6:PRINT"♥":END
1970 FORI=0TO15
1980 X=16*I+40
1990 Y=192:POKEFNK(0),I
2000 FORJ=0 TO 7
2010 POKEFNP(0),255
2020 Y=Y+1
2030 NEXT J
2040 NEXT I
2050 RETURN
5000 REM SET UP MULTI SCREEN
5010 FOR I=0 TO 999
5020 POKE I+1024,0
5030 POKE I+55296,0
5040 NEXT I
5050 FOR I=8192 TO 16191
5060 POKE I,0
5070 NEXT I
5080 DEF FNB(ZZ)=INT((7-(XAND7))/2)*2
5090 DEF FNC(ZZ)=INT(X/8)+INT(Y/8)*40+1024
5100 RETURN
10000 REM ROUTINE TO UNPLOT
10010 BI=FNB(0)
10020 LOC=PEEK(FNP(0))
10030 LOC=LOCAND255-2↑(BI)
10040 LOC=LOCAND255-2↑(BI+1)
10050 POKE FNP(0),LOC
10060 RETURN
11000 REM ROUTINE FOR BRUSH 1
11010 BI=FNB(0)
11020 LOC=PEEK(FNP(0))
11030 LOC=LOCOR2↑BI
11040 LOC=LOCAND255-2↑(BI+1)
11050 POKEFNP(0),LOC
11060 POKEFNC(0),(PEEK(FNC(0))AND15)+(COL(1)*16)
11070 RETURN
12000 REM ROUTINE FOR BRUSH 2
12010 BI=FNB(0)
12020 LOC=PEEK(FNP(0))
12030 LOC=LOCAND255-2↑(BI)
12040 LOC=LOCOR2↑(BI+1)
12050 POKEFNP(0),LOC
12060 POKEFNC(0),(PEEK(FNC(0))AND240)+COL(2)
12070 RETURN
13000 REM ROUTINE FOR BRUSH 3
13010 BI=FNB(0)
13020 LOC=PEEK(FNP(0))
13030 LOC=LOCOR2↑(BI)
13040 LOC=LOCOR2↑(BI+1)
13050 POKEFNP(0),LOC
13060 POKEFNK(0),COL(3)
13070 RETURN
READY.
```

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DISK USER

Tidy Directories on the 1541

Keeping directory entries in alphabetic sequence has been no problem on my 4040 disk drive. The copy disk utility would do it every time I took a backup copy of a disk. So it was easy to find names in a disk directory, even a long one, as it scrolled up the screen.

Having added a Commodore 64 and a 1541 disk drive to my collection, I needed some way to rearrange a disk directory. Although the disks are read compatible with 4040 disks, and so can be backed up on the 4040, it is not a good idea to intermix the drives for writing. Generally it works, but occasionally there are difficulties, and files can be corrupted. So this program was born. It is written for the CBM64, but with minor changes will run on a PET with a 4040 disk drive (just delete line 110).

Reading the Directory

The disk drive manual describes the format of the directory entries in track 18. The directory starts in sector 1, and pointers link it to subsequent sectors. They are not adjacent to each other, and so the trail has to be followed by the program. The final sector points to track 0 sector 255 to mark the end of the chain, so the program has to look for this. Each directory sector is read with the U1 command, and then GET# is used to create strings for the directory entries.

Scratched Files

When you scratch a file, the directory entry is not removed. Instead the DOS sets the file type to zero, and all of the other entries stay in their existing slots. Next time you add a file to the disk, the first empty slot in the directory is used for it. New entries will not necessarily go to the end of the list, and so your carefully sequenced list will be spoilt. The disk tidy program only selects entries for properly closed live files, ignores scratched entries, and stops if the file had not been closed properly. When the new directory is created there will be no empty gaps from scratched entries.

Writing the Directory

The well-known Shell sort is used to sequence the file names, and the program gives you the option to group them by file type (PRG, SEQ, USR, REL) if you wish. It then starts at the first directory sector, and rewrites the directory entries, following the original trail, using the U2 command to write the blocks. After the final entry, remaining slots are filled with blanks to the end of the original directory chain. So now when you add files to the disk, they will go at the end of the list.

```
100 rem ********************************
101 rem * directory tidy 1541/4040     *
102 rem * w.owen murcott 1983         *
103 rem * read / sort / rewrite        *
104 rem ********************************
110 poke53280,15:poke53281,15:print{blu}
120 printchr$(14)"{cls} TIDY DIRECTORY "
130 print"{dd}Load disk in drive 0.  RETURN = ready.
140 getz$:ifz$<>chr$(13)goto140
150 rem ********************************
151 rem * open files & buffer channel *
152 rem * set up initial parameters   *
153 rem ********************************
160 dn=8:d=0:c2=2:cc=15:t=18:s=0:bp=144
170 opencc,dn,cc,"i0":gosub1000
180 open c2,dn,c2,"#":gosub1000
200 rem ********************************
201 rem * get disk id : trck18/sctr0  *
202 rem ********************************
210 print#cc,"u1:"c2;d;t;s:gosub1000
220 print#cc,"b-p:"c2;bp
230 id$="":n=20:gosub1030:id$=z$
240 print"{d}Disk loaded :  "id$" "
300 rem ********************************
301 rem * set up directory arrays     *
302 rem * and sector trail            *
303 rem * allow for 19 sectors        *
304 rem * allow for 152 entries       *
305 rem ********************************
310 dim s%(19):rem next directory sector
311 dim ft$(192):rem file type
312 dim ts$(192):rem t&s of first data block
313 dim nf$(192):rem file name
314 dim fe$(192):rem file entries
315 dim sk$(192):rem sort keys
320 dim t$(4)
321 t$(1)="seq":t$(2)="prg":t$(3)="usr":t$(4)="rel"
for blank entries
330 fori=1to30:z0$=z0$+chr$(0):next:rem
350 rem ********************************
351 rem * read directory entries      *
352 rem ********************************
360 s=1:rem start sector
370 e=1:rem start file entry
380 print#cc,"u1:"c2;d;t;s:gosub1000:bp=1
```

```
390 print#cc,"b-p:";c2;bp:gosub1100:s%(s)=a:rem get next sector
400 print#cc,"b-p:"c2;bp:gosub1100:ft=a:rem get file type
410 ifft=0orft=128thenbp=bp+31:goto500:rem blank entry
420 ifft<128 thenprint"{d} FILE ERROR  Not closed":goto999
430 ft$(e)=a$
440 n=2:gosub1040:ts$(e)=z$:rem get t&s
450 n=16:gosub1040:nf$(e)=z$:rem get name
460 n=11:gosub1040:fe$(e)=z$:rem get file entries
470 rem *******************************
471 rem * print directory entry       *
472 rem *******************************
480 print,"  "nf$(e)" : "t$(ft-128)
490 bp=bp+2:e=e+1
500 ifbp<256goto400:rem for next entry
510 ifs%(s)<>255thens=s%(s):goto380:rem next sector
520 gosub1130:rem get ok to continue
530 e=e-1:ife=0goto730:rem directory is empty
540 print"Group by file type ? (y/n)
550 getz$:ft$=z$:ifz$="y"goto570
560 ifz$<>"n"goto550
570 rem *******************************
571 rem * set sort keys               *
572 rem * sort directory entries      *
573 rem * uses shell sort             *
574 rem *******************************
580 print"{d}Sorting ..."
590 fori=1toe:k=16
600 forj=1to16:ifmid$(nf$(i),j,1)=chr$(160)thenk=j-1:j=16
610 nextj:sk$(i)=left$(nf$(i),k)
620 ifft$="y"thensk$(i)=ft$(i)+sk$(i)
630 nexti:m=e
640 m=int(m/2):ifm=0goto730
650 k=e-m:j=0
660 ifj>kgoto640
670 i=j
680 ifi<0goto700
690 ifsk$(i+m)<sk$(i)goto710
700 j=j+1:goto660
710 a$=ft$(i):ft$(i)=ft$(i+m):ft$(i+m)=a$
711 a$=ts$(i):ts$(i)=ts$(i+m):ts$(i+m)=a$
712 a$=nf$(i):nf$(i)=nf$(i+m):nf$(i+m)=a$
713 a$=fe$(i):fe$(i)=fe$(i+m):fe$(i+m)=a$
714 a$=sk$(i):sk$(i)=sk$(i+m):sk$(i+m)=a$
720 i=i-m:goto680
730 rem *******************************
731 rem * write directory entries     *
732 rem *******************************
740 print"{u}Writing ... :  "id$" "
750 z$=chr$(0)+chr$(255):rem to terminate directory chain
760 s=1:n=1:rem start sector
770 print#cc,"u1:"c2;d;t;s:gosub1000:rem read directory sector
780 bp=2:rem first entry
790 ifn>egoto890:rem no more live entries
800 ifbp<256goto840:rem not yet full
820 print#cc,"u2:"c2;d;t;s:gosub1000:rem write directory sector
830 s=s%(s):goto770:rem next sector
840 print#cc,"b-p:";c2;bp:rem set pointer to next entry
850 print,"      "nf$(n)" : "t$(asc(ft$(n))-128)
860 print#c2,ft$(n);ts$(n);nf$(n);fe$(n);:rem directory entry
870 bp=bp+32:n=n+1:goto790
890 ifbp>255goto930:rem full sector
```

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Calco Software

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```
900 print#cc,"b-p:";c2;bp
910 print#c2,z0$;:rem blank entry
920 bp=bp+32:goto890
930 bp=0:print#cc,"b-p:";c2;bp
940 print#c2,z$;:rem end of directory chain
950 print#cc,"u2:"c2;d;t;s:gosub1000:rem write directory sector
960 z$=left$(z0$,2):rem blanks for further chains
970 s=s%(s):ifs=255goto999:rem finished
980 print#cc,"u1:"c2;d;t;s:gosub1000:rem read empty directory sector
990 bp=2:goto900:rem to clear out sector
999 closec2:closecc:end
1000 rem ******************************
1001 rem * input error channel status *
1002 rem ******************************
1010 input#cc,en,em$,et,es:ifen=0thenreturn
1020 print"{cls} DISK ERROR "en;em$;et;es:goto999
1030 rem ******************************
1031 rem * get n characters           *
1032 rem * from buffer                *
1033 rem ******************************
1040 z$=""
1050 fori=1ton:gosub1100
1060 z$=z$+a$:next:return
1100 rem ******************************
1101 rem * input from buffer          *
1102 rem ******************************
1110 get#c2,a$:ifa$=""thena$=chr$(0)
1120 a=asc(a$):bp=bp+1:return
1130 rem ******************************
1131 rem * get ok to continue         *
1132 rem ******************************
1140 print"{d}OK to continue ? (y/n)
1150 getz$:ifz$="n"goto999
1160 ifz$<>"y"goto1150
1170 print"{u}                  {u}":return
```

A COMPUTING INTEGRATOR

Part One

Chromatography is perhaps the most widely used tool in analytical chemistry. It is used for separating individual components from a complex mixture. Thus it is employed for identifying and quantifying compounds. Chromatography equipment will be found in laboratories ranging from those of water authorities and breweries to those involved in medical research and genetic engineering.

Chromatographic separation depends on how compounds react as they pass dissolved in a moving or mobile phase (e.g. water) over a stationary phase (e.g. silica). It is mainly the physico-chemical properties of the separating molecules, such as their solubility in the mobile phase and their absorption onto the surface of the stationary phase, that dictates how they will move and separate. At its simplest level, a drop of blue ink on blotting paper will separate into rings of its component colours. In the same way a hydrolysed protein can be made to separate into its component amino acids by passing the mixture through a tube containing suitable packing material.

Amazing advances have been recently made possible by developments in the manufacture of stationary phase, improvements in both the composition and mode of transport of the mobile phase and in the design of detectors. These days it is possible to separate and purify practically any compound into a pure molecular species. If a mass spectrometer is used as a detector then a compounds atomic composition and even its molecular structure can be computed – and all on a few micrograms of sample!

Two main types of chromatography – Gas and Liquid (indicating the state of the mobile phase) are used. Often one hears people talking about GLC and HPLC. Gas – liquid chromatography (GLC) has the stationary phase as a liquid film (wax) covering a solid surface. HPLC refers to high pressure liquid chromatography were the liquid phase is pumped at high pressure (many hundreds of atmospheres) over a very fine stationary phase (paricles may be only a few microns in diameter). Both types of chromatography have a tube or column through which the mixture is passed. The detector is at the outlet (Figure 1).

Most laboratories have a chart recorder connected to the output of the chromatograph Figure 2 shows a typical tracing. The deflection of the pen is related to the concentration of compound emerging from the column. But how do we know how much is there? We could simply measure the heights of the peaks, but substances diffuse as they pass along the column. Peaks on the column for a long time (long retention time) are more spread out. It is therefore the *integrated* detectors response during the emergence of the peak that relates to the component's mass.

One can simply cut the little peaks out from the recording paper and weigh them. This is inaccurate and time-consuming. It's a disaster too if the signal goes out-of-range or one happens to sneeze at the wrong time!

The solution is to use an electronic integrator. This automatically reports the area under each peak. But what exactly does the analyst require? The analyst wants not only to be able to identify his compounds, but also to quantify them. Identification is normally done with reference to a compound's retention time. Under stable conditions, compounds remain on the column for a set time – the retention time – and this can be used for identification. Standards (made from mixtures of pure known substances) are employed not only for defining retention times, but also for quantification.

Blood alcohol analysis is a good example. Here an extract of the blood is put into a gas chromatograph. The alcohol (ethanol) volatalizes and separates as a descrete peak on the recorder (Figure 2). The retention time is known. Beforehand, however, a small amount of a different alcohol (propanol) was added to the blood to give a very precise concentration. This gives rise to the second peak in Figure 2. Clearly, by relating the peak area of the ethanol to that of the propanol we can estimate the blood alcohol in milligrams per hundred millilitres of blood.

Exactly what the analyst (and police!) need to know. The sort of integrator that the analyst requires, therefore, is one that not only integrates, but is capable of making 'time windows' for retention times which are then given a chemical name. It should also have the capacity of working out concentrations based on internal standard (as above) or external standard. The Reader will realize how simple this task is a for microcomputer!

Indeed, there has been a move towards interfacing basic digital integrators (which report just areas and retention times) to computers like the Commodore PET and APPLE. This is quite costly because it involves purchasing an RS232 (teletype) board for the integrator, and then another interface for the computer (e.g. RS232/IEEE-488). Dedicated integrators which have computing capability (i.e. with a BASIC interpreter) can be very expensive. So how about getting a microcomputer to integrate? What are the problems?

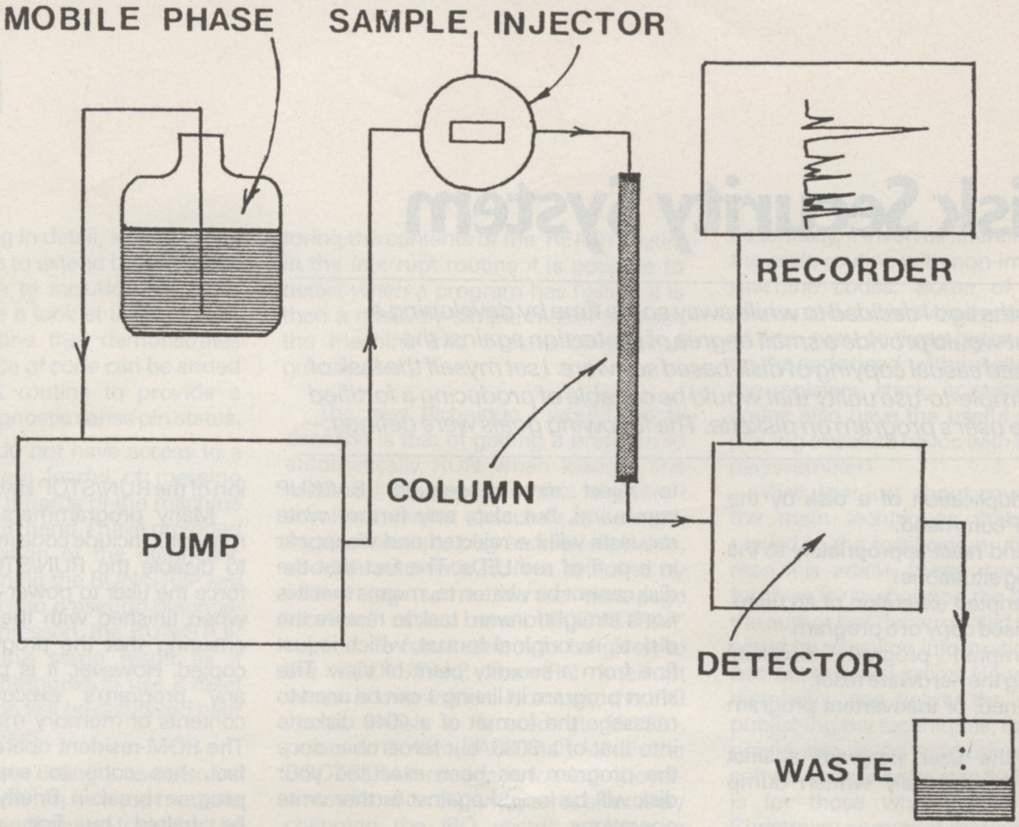
The most important requirement of an integrator is that it does its job with great accuracy and precision. Integrators conventionally use a voltage to frequency converter and the string of pulses are counted. Another approach is to use an alalogue to digital converter (ADC). To give the required accuracy their needs to have at least 12 bits resolution (i.e. 1 in 4096). It should also operate as a true integrating converter, rather than the successive approximation type. But chromatographers require a wide dynamic range – some peaks are very small, yet others may be large. So the ADC needs an amplifier whose gain can be under software control. An eight-stage programmable attenuator would give us ranges of:–

x 128, x 64, x 32, x 16, x 8, x 4 and 1.

We can see now how to design our hardware. If we are using a PET (as this article describes) then it would be nice to have the ADC on the IEEE-488 bus, or on the memory expansion port, leaving the parallel user port free.

The software is a different matter. Obviously it has to take in the digital data, possibly at rates of up to 20 Hz. For an IEEE device handled by BASIC, the data acquiring routine alone might not work faster than this! Therefore we either have the option of integrating in

Figure 1. Diagram of an HPLC system



real time by machine-code, or, after the run has finished, by PEEKing the (stored) data out of memory locations and doing a post-run analysis using BASIC.

End of Part One.

Part Two

Describes integration programming details for the PET microcomputer.

The sample is injected using the manifold at A. This will normally be dissolved in the mobile phase. The pump forces the sample under high pressure through the separating column which contains the stationary phase.

As the solvent emerges from the end of the column it passes along a narrow tube to the detector. This is often a UV detector which senses the absorbtion of light. A positive response occurs when a separated component crosses the light beam and is shown on the recorder. An integrator's task is to measure the area under each peak.

Four analyses are shown (1,2,3,4). Two main peaks can be seen, one of these is due to alcohol, presumably consumed by the subject, the second (larger) peak is another alcohol (propanol) used as an internal standard which was purposly added to the sample before analysis. By comparing the areas of the two peaks one can calculate the blood alcohol/ concentration.

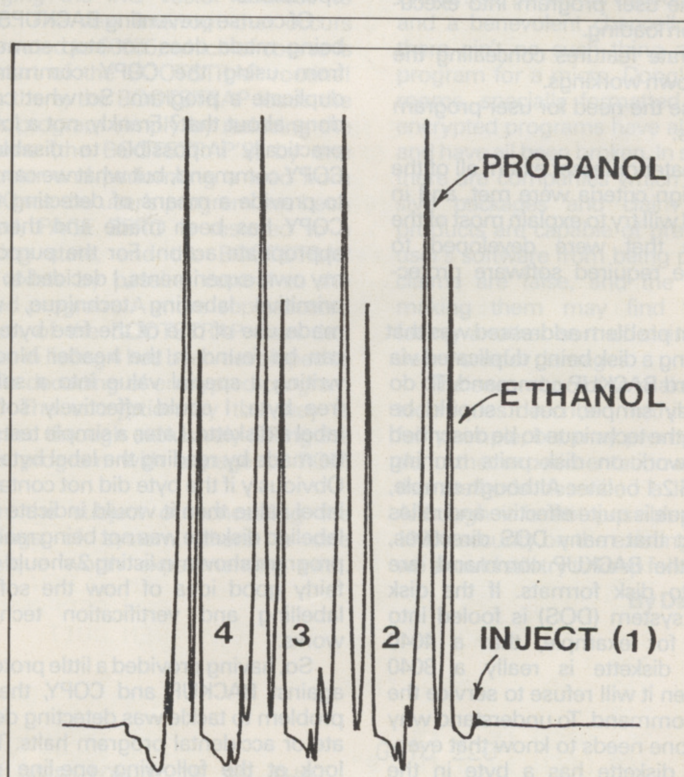


Figure 2. Typical tracings from a gas chromatography (GLC) during blood alchol analysis.

A Disk Security System

A few months ago I decided to while away some time by developing a system that would provide a small degree of protection against the unauthorised casual copying of disk-based software. I set myself the task of writing a simple-to-use utility that would be capable of producing a fortified version of a user's program on diskette. The following goals were defined:–

1) Inhibit duplication of a disk by the BACKUP command.
2) Detect and react appropriately to the following situations:
   i) Attempted execution of an unauthorised copy of a program
   ii) Attempted program 'break-in' using the hardware reset.
   iii) Planned, or inadvertent program halt.
3) Protect the user program against perusal by specially written dump utilities.
4) Force the user program into execution upon loading.
5) Incorporate features concealing the utility's own workings.
6) Minimise the need for user-program changes.

To a greater or lesser extent all of the above design criteria were met, and in this article I will try to explain most of the techniques that were developed to provide the required software protection.

The first problem addressed was that of preventing a disk being duplicated via the standard BACKUP command. To do this is fairly simple, but it should be stated that the technique to be described will only work on disk units running under DOS 2.1 or later. Although simple, the technique is quite effective and relies on the fact that many DOS directives, including the BACKUP command, are sensitive to disk formats. If the disk operating system (DOS) is fooled into believing, for example, that a 4040 formatted diskette is really a 3040 diskette then it will refuse to service the BACKUP command. To understand why this is so, one needs to know that every formatted diskette has a byte in the header block which has a code reflecting the DOS and unit type under which the diskette was HEADERed. By tweaking the format identifier in the header block, we can disguise the disk's true format. Not only will said tweak cause the DOS to reject any subsequent BACKUP command, but also, any further write requests will be rejected and disappear in a puff of red LEDs. The fact that the disk cannot be written to, means that it is not a straightforward task to restore the disk to its original format, which is just fine from a security point of view. The short program in listing 1 can be used to massage the format of a 4040 diskette into that of a 3030, but remember once the program has been executed your disk will be locked against further write operations.

Of course preventing BACKUPS from being made does not stop somebody from using the COPY command to duplicate a program. So what can be done about that? Frankly, not a lot! It is practically impossible to disable the COPY command, but what we can do, is to provide a means of detecting that a COPY has been made and then take appropriate action. For the purpose of my own experiments, I decided to use a primitive labelling technique, which made use of one of the free bytes that can be found in the header block. By writing a special value into a selected free byte, I could effectively software label a diskette. Later, a simple test could be made by reading the label byte back. Obviously if the byte did not contain the label value then it would indicate that a labelled diskette was not being read. The program shown in listing 2 should give a fairly good idea of how the software labelling and vertification technique works.

So, having provided a little protection against BACKUP and COPY, the next problem to tackle was detecting deliberate or accidental program halts. Take a look at the following one-line public domain program:–

```
10 GOTO 10
```

The effect of running this program will be to put the machine into an endless spin, until halted by a depression of the RUN/STOP key.

Many programmers, as a security measure, include code in their programs to disable the RUN/STOP key and so force the user to power-off the machine when finished with the program, thus ensuring that the program cannot be copied. However, it is possible to stop any program's execution with the contents of memory maintained intact. The ROM-resident operating system, in fact, has code to support a forced program break-in. Briefly, a program can be halted by first grounding the diagnostic sense pin on the user port and forcing a hardware reset. This can be done by getting under the bonnet of the machine with a couple of pieces of wire, although a more elegant and safe approach is provided by commercially available reset boxes. What this all means, is that whatever steps are taken to, say, force automatic program execution with the stop key disabled, the user still has a way of halting the program, regaining control of the machine, and examining and saving the contents of memory. That is unless we do something to stop the young boy. Probably the most effective way of putting paid to reset boxes and the like is to modify the clock interrupt routine to include a test on the status of the diagnostic sense pin. For those of you not familiar with the internal workings of the PET's operating system, every 1/60th. of a second, an interval of time which is sometimes referred to as a jiffy, any active program is suspended and a routine in ROM is given control. The routine performs various 'housekeeping' tasks, like blinking the cursor, updating the system clock (variable TI$), and scanning the keyboard for keystrokes. After completion of this 'interrupt activity,' as it is called, control is returned to either the BASIC input routine or to the user program, whichever was active when the clock interrupt occured. It is beyond the scope of this article to discuss

MACHINE CODE

interrup handling in detail, suffice to say that it is possible to extend the jiffy clock interrupt routine to include user own-code. If you take a look at listing 3, you will find a routine that demonstrates how a small piece of code can be added to the interrupt routine to provide a check on the diagnostic sense pin status.

For those who do not have access to a reset box and are fearful of messing around with the innards of the machine with bits of wire in hand, I have provided a simple simulation of the diagnostic sense pin by turning the RUN/STOP key on the keyboard into a pseudo diagnostic sense pin. If pressed, the RUN/STOP key will yield the same result as if someone had attempted to use a reset box, i.e. a splodge will be displayed near the top of the screen.

The program in listing 3 can also be used to show how an interrupt routine can be used to monitor and trap a halt of program execution. The trap developed is particularly useful because it will catch any program halt, whether caused through an error, dropping to the end of program, or because the user responded with a RETURN in reply to an INPUT directive. The trap is actually sprung any time the BASIC 'READY' message is displayed, and that includes those occasions when the user returns to BASIC from the machine language monitor via an 'x' command. How does it all work? Well, as a result of some experimentation, I discovered that whenever the 'READY' message appears, there are 4 bytes in PAGE ZERO that wind up containing 4 specific values. The bytes in question are $5F, $60, $6C and $6E: When BASIC is given control, and displays 'READY,' those bytes contain $12, $B3, $12, and $1A respectively. So by continuously monitoring the contents of the 'READY' bytes in the interrupt routine it is possible to detect when a program has halted. It is then a relatively simple matter to place the machine into a state of graceful quiescence!

The next technique I would like to describe is that of getting a program to automatically RUN when loaded. The method I developed for this is given, I admit somewhat obscurely, in listing 4. Again, interrupts play an important role, and the automatic RUN is achieved by overwriting some of the zero-page locations with a small 'BOOTSTRAP' routine. To force control to be given to the BOOTSTRAP, the IRQ interrupt vector is overwritten. Normally, the IRQ vector, which is located at $90/$91, points to $E455 (BASIC 4.0). When the BOOTSTRAP routine is loaded, it overwrites location $91 with zero, effectively changing the IRQ vector address to $0055. The next interrupt that occurs gets routed to $0055, which of course is the start of the BOOTSTRAP routine! From there, the BOOTSTRAP loads the user's program simply by reducing the filename (the BOOTSTRAP'S) by one character and performing a load from disk. Once the user's program has been loaded, PAGE ZERO is restored to a working state, and the BOOTSTRAP then exists by passing control to the loaded program. A more sophisticated version of the BOOTSTRAP than that shown in listing 4 has been developed to handle decoding of encrypted program code. The encryption by the way is achieved through exclusively ORing the user's program with a page of ROM bytes.

On the subject of concealing the workings of system, there is one technique worth experimenting with. Essentially, it involves liberally sprinkling the code routine with non-implemented machine codes. Some of the unimplemented codes actually perform skips of one, two, or three bytes, depending on the code used, without altering any of the registers, stack, or status bits. The codes also have the useful property of playing absolute havoc with the average disassembler!

Well, that just about covers most of the main techniques that were employed in the fortification utility. Having read this article, many readers will be forgiven for harbouring the thought that the author has decremented his marbles count by revealing information that only has worth if kept secret. However before dismissing too lightly the wisdom of publishing my techniques, the following points should be noted. Firstly, faith in software security on stand-alone micros is for those who believe in Father Christmas, perpetual motion machines, and a benevolent chancellor. In short, there ain't no such thing as a secure program for a micro. Dongles, security rooms, specially formatted disks, and encrypted programs have all been tried and have all been broken. In spite of this, there are companies which sell expensive packages and claim that their products are capable of preventing the user's software from being pirated. The claims are false, and the companies making them may find themselves facing another sort of claim from the user – one for damages.

The second point to make is that the techniques described in this article are fairly simple, but may prompt others to do further experimentation and develop the methods described a little further. Although it is not possible to provide 100% security on the existing hardware, we should still try to keep folk honest!

By Danny Doyle

LISTING 1

```
100 :                                            GOTO 220
110 :    CHANGE HEADER BLOCK VERSION BYTE SO THAT
120 :    ATTEMPTED BACKUP COMMANDS WILL FAIL.
130 :    AS A SIDE EFFECT, DISK BECOMES  WRITE-PROTECTED.
140 :
150 :    AUTHOR: DANNY DOYLE
160 :    DATE: MARCH '83
170 :
```

```
180 :  ************************************
190 :  * WARNING - ASSUMES DISK IS IN DRIVE 0 *
200 :  ************************************
210 :
220 OPEN 15,8,15                 :REM OPEN COMMAND CHANNEL
230 OPEN 10,8,10,"#"             :REM OPEN BUFFER FOR BLOCK I/O
240 PRINT#15,"U1:10,0,18,0"      :REM READ HEADER BLOCK
250 PRINT#15,"B-P:10,2"          :REM POSITION TO VERSION BYTE
260 PRINT#10,CHR$(1);            :REM        T W E A K !
270 PRINT#15,"U2:10,0,18,0"      :REM WRITE BACK HEADER BLOCK
280 CLR                          :REM CLOSE ALL OPEN FILES
290 OPEN 15,8,15,"I0"            :REM FORCE BAM UPDATE
300 CLOSE 15                     :REM CLEAN UP
310 PRINT" NORMAL TERMINATION"   :REM QUIT
320 END
330 :
340 :
350 :
```

L I S T I N G   2

```
                                                      GOTO 200
100 :
110 :  LABEL BYTE NUMBER 186 IN THE HEADER BLOCK WITH
120 :  A SHIFTED SPACE ( CHR$(160) ).
130 :
140 :  AUTHOR: DANNY DOYLE
150 :
160 :  ************************************
170 :  * WARNING - ASSUMES DISK IS IN DRIVE 0   *
180 :  ************************************
190 :
200 GOSUB 350                    :REM PERFORM LABEL CHECK
210 OPEN 15,8,15                 :REM OPEN COMMAND CHANNEL
220 OPEN 10,8,10,"#"             :REM OPEN BUFFER FOR BLOCK I/O
230 PRINT#15,"U1:10,0,18,0"      :REM READ HEADER BLOCK
240 PRINT#15,"B-P:10,186"        :REM POSITION TO FREE BYTE
250 PRINT#10,CHR$(160);          :REM LABEL THE DISK
260 PRINT#15,"U2:10,0,18,0"      :REM WRITE BACK HEADER BLOCK
270 CLR                          :REM CLOSE ALL OPEN FILES
280 OPEN 15,8,15,"I0"            :REM FORCE BAM UPDATE
290 CLOSE 15                     :REM CLEAN UP
300 GOSUB 350                    :REM PERFORM LABEL CHECK
310 PRINT" NORMAL TERMINATION"   :REM QUIT
320 :
330 :     LABEL CHECKER
340 :
350 OPEN 15,8,15                 :REM OPEN COMMAND CHANNEL
360 OPEN 10,8,10,"#"             :REM OPEN BUFFER FOR BLOCK I/O
370 PRINT#15,"U1:10,0,18,0"      :REM READ HEADER BLOCK
380 PRINT#15,"B-P:10,186"        :REM POSITION TO LABEL BYTE
390 GET#10,LABEL$                :REM READ THE LABEL
400 PRINT "DISK HAS ";           :REM REPORT LABEL STATUS
410 :
420 IF NOT ( ASC(LABEL$) = 160 )  THEN PRINT "NOT YET ";
```

MACHINE CODE

```
430 PRINT "BEEN LABELLED."
440 CLOSE 10 : CLOSE 15          :REM CLEAN UP
450 RETURN                       :REM RETURN
460 :
470 :
480 :
```

```
L I S T I N G   3
100 :                                      GOTO 250
110 : ROUTINE TO DEMONSTRATE HOW PROGRAM BREAK-INS
120 : CAN BE DETECTED AND ACTED UPON. AN EXTENSION
130 : TO THE CLOCK INTERRUPT HANDLER IS SITED IN
140 : THE SECOND CASSETTE BUFFER. THE EXTENSION
150 : PROVIDES A CONTINUOUS MONITOR OF THE DIAGNOSTIC
160 : SENSE PIN, RUN/STOP KEY, AND PROGRAM STATUS.
170 : A SPLODGE ( CHR$(255) ) IS DISPLAYED CONTINUOUSLY
180 : IF THE PROGRAM HALTS, OR INTERMITTENTLY IF THE DSP
190 : OR RUN/STOP KEY IS ACTIVATED. SPLODGE ACTION COULD
200 : BE UPGRADED TO PROVIDE QUICK BUT GRACEFUL QUIESCENCE!
210 :
220 :   AUTHOR: DANNY DOYLE
230 :   DATE: MARCH '83
240 :
250 DATA  120 , 169 , 68 , 133 , 144 , 169 , 3 , 133
260 DATA  145 , 96 , 32 , 234 , 255 , 173 , 16 , 232
270 DATA  16 , 30 , 165 , 155 , 201 , 239 , 240 , 24
280 DATA  165 , 95 , 201 , 18 , 208 , 23 , 165 , 96
290 DATA  201 , 179 , 208 , 17 , 165 , 108 , 201 , 18
300 DATA  208 , 11 , 165 , 110 , 201 , 26 , 208 , 5
310 DATA  169 , 255 , 141 , 255 , 128 , 169 , 255 , 133
320 DATA  155 , 76 , 88 , 228 , 234
330 :
340 FOR I= 826 TO 886
350 READ N
360 POKE I,N                      : REM BUILD INTERRUPT HANDLER
370 NEXT I
380 :
390 SYS 826                       : REM INITIALISE INTERRUPT HANDLER
400 :
410 PRINT "▒▒▒                       <---- WATCH WHEN STOP KEY PRESSED"
420 PRINT "                             OR RESET BOX IS USED
430 PRINT "                             TO STOP PROGRAM ENTER %"
440 GET A$
450 IF A$ <> "%" THEN 410
460 PRINT"▒TRY TO CLEAR SCREEN,"
470 PRINT"BUT IT WILL NEVER BE CLEAN."
480 PRINT"THE SPLODGE WILL REMAIN"
490 PRINT"UNTIL RUN AGAIN."
500 END
510 :
520 :
530 :
READY.
```

MACHINE CODE

```
L I S T I N G   4
100 :                                                  GOTO 220
110 : ROUTINE TO CREATE A BOOTSTRAP LOADER FOR ANY BASIC PROGRAM.
120 : AFTER EXECUTION A PROGRAM CALLED 'B$STRAP' WILL HAVE BEEN
130 : CREATED.
140 : USER-PROGRAM SHOULD BE RENAMED WITH LAST CHARACTER DROPPED.
150 : B$STRAP SHOULD BE GIVEN THE ORIGINAL USER-PROGRAM NAME.
160 : AUTOMATIC EXECUTION OF PROGRAM WILL THEN OCCUR IF USER-PROGRAM
170 : IS LOADED SPECIFYING ORIGINAL NAME.
180 :
190 :    AUTHOR: DANNY DOYLE
200 :    DATE: MARCH '83
210 :
220 DATA  76 , 115 , 195 , 8 , 0 , 91 , 22 , 0
230 DATA  19 , 4 , 0 , 0 , 50 , 0 , 20 , 32
240 DATA  0 , 128 , 0 , 22 , 19 , 0 , 8 , 18
250 DATA  179 , 0 , 146 , 0 , 18 , 96 , 210 , 176
260 DATA  5 , 233 , 206 , 32 , 22 , 0 , 85 , 32
270 DATA  1 , 4 , 178 , 5 , 178 , 5 , 178 , 5
280 DATA  0 , 120 , 254 , 127 , 0 , 120 , 165 , 202
290 DATA  133 , 43 , 165 , 201 , 133 , 42 , 32 , 233
300 DATA  181 , 32 , 182 , 180 , 169 , 0 , 133 , 98
310 DATA  133 , 99 , 133 , 100 , 133 , 101 , 76 , 74
320 DATA  183 , 76 , 31 , 0 , 19 , 169 , 228 , 133
330 DATA  145 , 198 , 209 , 230 , 120 , 169 , 0 , 133
340 DATA  150 , 32 , 113 , 243 , 208 , 208 , 138 , 255
350 DATA  0 , 0 , 0 , 0 , 0 , 0 , 14 , 179
360 DATA  230 , 119 , 208 , 2 , 230 , 120 , 173 , 2
370 DATA  4 , 201 , 58 , 176 , 10 , 201 , 32 , 240
380 DATA  239 , 56 , 233 , 48 , 56 , 233 , 208 , 96
390 DATA  128 , 79 , 199 , 82 , 134 , 0 , 9 , 169
400 DATA  85 , 0 , 120 , 212 , 255 , 179 , 64 , 13
410 DATA  0 , 95 , 2 , 255 , 0 , 170 , 256
420 :
430 OPEN 10,8,10,"@0:B$STRAP,P,W"
440 PRINT#10,CHR$(0);CHR$(0);
450 READ N
460 IF N <> 256 THEN PRINT#10,CHR$(N); : GOTO 450
470 CLOSE 10
480 PRINT "NORMAL TERMINATION"
490 END
500 :
510 :
520 :
```

BUSINESS AND PLEASURE ON THE 64!

The Commodore 64 is the ideal machine to combine business with pleasure. It has a typewriter keyboard and lots of memory — ideal for word processing or financial planning — plus some rather clever colour and sound chips that are just what you need for realistic arcade action.

BUSICALC is just the program for those who need to juggle with figures. You could use it to plan your household finances or your personal tax — but it's equally capable of handling much larger figures. If you've got a printer you'll be able to produce reports that are good enough to put before the board (or the bank manager) — but a printer isn't necessary, and neither is a disk drive. BUSICALC costs just £39 plus VAT on tape, or £40.50 on disk; there are versions at the same prices for the PET and VIC-20 (with 16k expansion).

The best word processor you can buy for the 64 is VIZAWRITE. The first thing you'll like is being able to use it right away — you won't have to re-read the manual ninety-four times to find out how to get started. The next is the wide range of printers you can use from the VIC printer to a Diablo or Qume — plus many others in between (like the Epson). Virtually any parallel printer can be operated off the User Port for the price of a simple cable, and features such as underlining, superscripts, subscriptions, and emphasised printing are easily accessed. Formatting on screen means that you can see the text as it will print before it prints — and this isn't the only resemblance between VIZAWRITE and dedicated word processing stations costing £10,000 or more. VIZAWRITE costs a mere £69 plus VAT on disk; a tape-based version should be available very soon.

MIKRO ASSEMBLER plugs into the cartridge port of the 64. As PET and VIC owners are already well aware, MIKRO makes writing machine code programs almost as easy as Basic, because it is a real assembler with LABELS. To help you write your program MIKRO has AUTO, DELETE, and FIND commands; to help you debug it there's a machine code monitor; and you can DISASSEMBLE from Basic or in the monitor! The TABLE commands displays or prints an alphabetically sorted symbol table after assembly — which is really fast (MIKRO will assemble 2k of code in just 20 seconds). If you are writing more than (say) 4k of code you may have to split your source code into several files, but MIKRO will automatically link these together at assembly time, loading them from tape or disk as appropriate. The MIKRO module costs £50 plus VAT; it could be the best investment you ever make.

With ARROW installed in your 64 the Commodore cassette unit LOADS AND SAVES PROGRAMS SEVEN TIMES FASTER! Almost as fast as the 1541 disk, in fact. There is however a small difference in price — because ARROW costs just £39 plus VAT. ARROW has its own load and save commands, so you can still load and save at normal speed if you should want to. ARROW is a tried and tested product that we've been selling on the PET for several years; now 64 owners can also benefit.

Now for the lighter side of our range. TANK ATAK, KAKTUS and MANGROVE are arcade games with colour and sound; a joystick is recommended, but is not esential. They each cost £8 plus VAT on cassette or £9.50 on disk.

Supersoft
Winchester House, Canning Road,
Wealdstone, Harrow,
Middlesex, HA3 7SJ, England
Telephone: 01-861 1166

A complete nominal ledger system for accountants

Part 5: Amending The Parameters

After a two month summer break, we return to our complete nominal ledger system for accountants with the parameter amendment listing.

This will allow you to alter records built up using previous programs in the series.

The original article, in our February issue, described the overall structure of this suite of programs, and although back issues are no longer available, we have got a number of reprints of the article at a cost of 50p each (to cover time and copying).

The other programs in the series appeared in our March and April issues, and are also available as reprints, again at a cost of 50p each.

The whole system is available on disk, at a cost of £25.00. Send in a blank disk to the address on the masthead, telling us which disk system you'd like it formatted for, and we'll return it with all the programs, plus some sample data so that you can see it in action.

The program will actually work on any dual disk drive, and, with alterations, on a single drive as well. As it stands, data is stored on drive 1 and the programs on drive 0, but this could be altered if required.

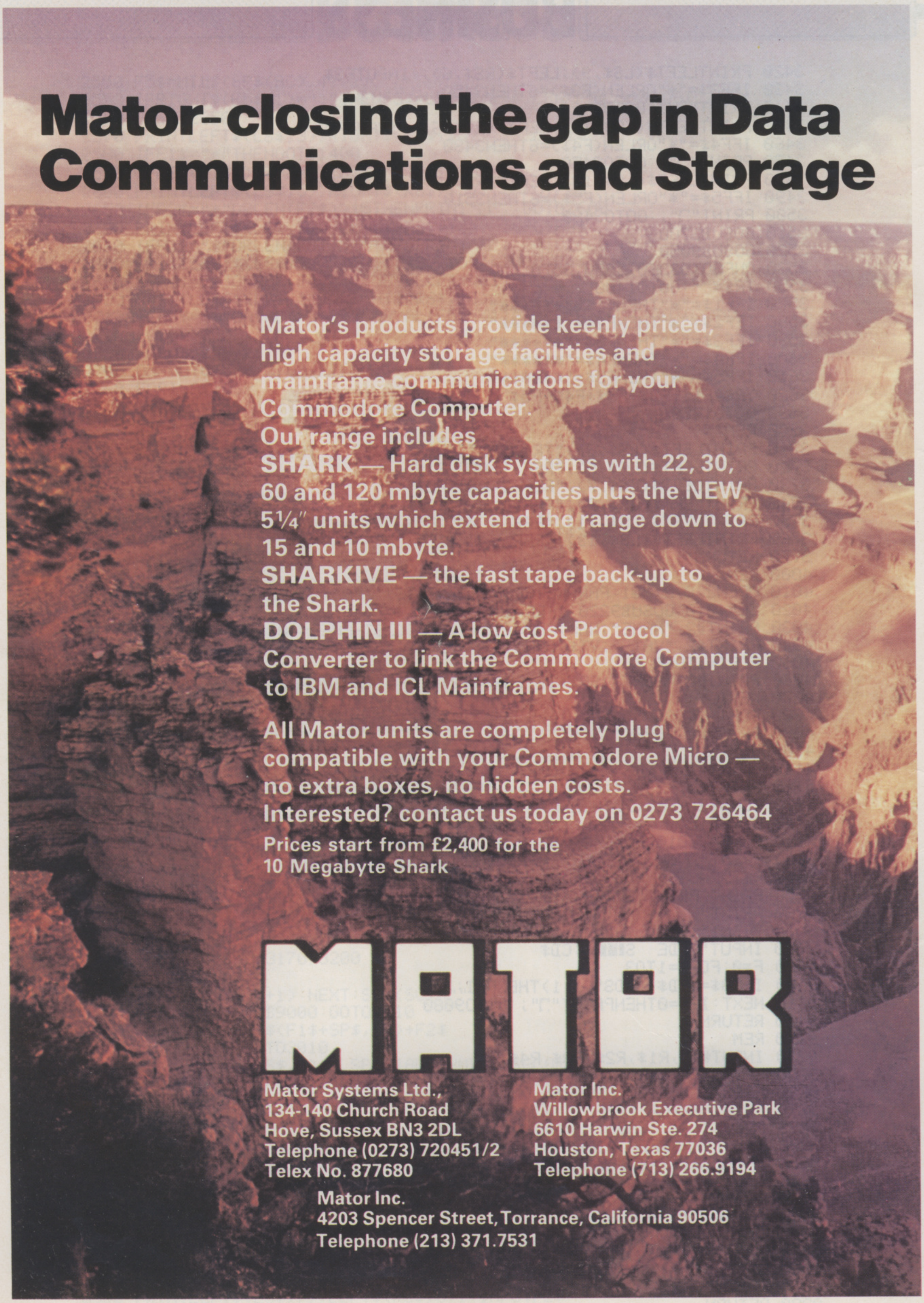
It was designed to work on a 40 column, Basic 2 Pet, but with minor modifications will run on any of the Commodore family of computers. The line to be changed is line number 4150, which alters the start of variables prior to re-loading the menu.

```
100 DIMSR$(10),SC$(10)
110 LS$="▌▌▌▌▌▌▌▌▌▌▌▌▌▌▌▌▌▌▌▌▌▌▌▌▌▌"
120 RS$="▐▐▐▐▐▐▐▐▐▐▐▐▐▐▐▐▐▐▐▐▐▐▐▐▐▐▐▐▐▐▐▐▐▐▐▐▐▐▐"
130 NM$="":VT$="":TR$="":SR=0:SC=0
140 SP$="                                         "
1010 GOSUB9000
1020 PRINT"▩▩"
1030 INPUT"OPERATORS NAME   *▌▌▌";OP$
1040 IFOP$="*"THENPRINT"▜";:GOTO1030
1050 INPUT"TODAY'S DATE    *▌▌▌";TD$
1060 IFTD$="*"ORLEN(TD$)<>6THENPRINT"▜";:GOTO1050
1070 DD=VAL(LEFT$(TD$,2)):MM=VAL(MID$(TD$,3,2)):YY=VAL(RIGHT$(TD$,2))
1080 IFMM<1ORMM>12ORYY<79ORDD<1ORDD>31THENPRINT"▜";:GOTO1050
1090 OPEN15,8,15
1100 INPUT"IS THERE A B/F FILE (Y/N)    Y▌▌▌";BF$
1110 IFBF$="N"THEN1400
1120 IFBF$<>"Y"THENPRINT"▜";:GOTO1100
1140 OPEN1,8,3,"1:PARAMETERS,SEQ,READ":IFST=0THEN1160
1150 EL=1140:GOSUB9220:IFRP=1THEN1140
1160 INPUT#1,IR$:IFST=0THEN1180
1161 PRINTIR$
1170 EL=1160:GOSUB9220
1180 RT$=LEFT$(IR$,4):IFRT$="ZZZZ"THENCLOSE1:GOTO1400
1200 IFRT$="NAME"THENNM$=RIGHT$(IR$,LEN(IR$)-4):GOTO1160
1210 IFRT$="VAT "THENVT$=RIGHT$(IR$,LEN(IR$)-4):GOTO1160
1220 IFRT$="SORT"THENSR=SR+1:SR$(SR)=RIGHT$(IR$,LEN(IR$)-4):GOTO1160
1230 IFRT$="SPEC"THENSC=SC+1:SC$(SC)=RIGHT$(IR$,LEN(IR$)-4):GOTO1160
1240 IFRT$="TRRF"THENTR$=RIGHT$(IR$,LEN(IR$)-4):GOTO1160
1250 GOTO1160
1400 REM
1410 GOSUB9000
1420 PRINT:PRINT
1430 PRINT"   RECORD TYPE         REQUEST CODE"
1440 PRINT"   ───────────         ─────────────"
1450 PRINT"  COMPANY NAME               1"
1460 PRINT"    V.A.T.                   2"
1470 PRINT"  SORT CONTROL               3"
1480 PRINT"  SPECIAL SYMBOL             4"
1490 PRINT"  TRANS. REF. TABLE          5"
1500 PRINT
1510 INPUT"REQUEST CODE OR 'E' TO END  *▌▌▌";RQ$
1520 IFRQ$="E"THEN4000
1530 IFRQ$="*"ORVAL(RQ$)<1ORVAL(RQ$)>5THENPRINT"▜";:GOTO1510
1560 GOSUB9000
1570 ONVAL(RQ$)GOTO1600,2000,2500,3000,3300
1600 IFNM$=""THENGOSUB9310:GOTO1630
1610 F1$=LEFT$(NM$,30):F2$=MID$(NM$,31,22):F3$=MID$(NM$,53,22)
1630 GOSUB1830
```

```
1650 PRINTLEFT$(LS$,5);LEFT$(RS$,15);:INPUTF1$
1660 IFF1$="*"THENPRINT"⌝";:GOTO1650
1670 PRINTLEFT$(LS$,7);LEFT$(RS$,15);:INPUTF2$
1680 IFF2$="*"THENPRINT"⌝";:GOTO1670
1690 PRINTLEFT$(LS$,9);LEFT$(RS$,15);:INPUTF3$
1700 IFF3$="*"THENPRINT"⌝";:GOTO1690
1710 GOSUB1830:GOSUB9050:ONFGOTO1650,1770,1780
1770 NM$="":GOTO1400
1780 REM
1790 NM$=LEFT$(F1$+SP$,30)+LEFT$(F2$+SP$,22)+LEFT$(F3$+SP$,22)
1800 GOTO1400
1830 REM
1840 PRINTLEFT$(LS$,3);"COMPANY NAME RECORD"
1850 PRINTLEFT$(LS$,5);"NAME          :";:PRINT"▮▮▮";F1$
1860 PRINTLEFT$(LS$,7);"ADDR. LINE 1 :▮▮▮";F2$
1870 PRINTLEFT$(LS$,9);"ADDR. LINE 2 :▮▮▮";F3$
1880 RETURN
2000 REM VAT
2010 IFVT$=""THENGOSUB9310:GOTO2050
2020 F1$=LEFT$(VT$,1):F2$=MID$(VT$,2,5):F3$=MID$(VT$,7,1)
2030 F4$=MID$(VT$,8,5):F5$=MID$(VT$,13,1):F6$=MID$(VT$,14,5)
2040 F7$=MID$(VT$,19,3):F8$=MID$(VT$,22,3)
2050 GOSUB2350
2070 PRINTLEFT$(LS$,5);LEFT$(RS$,25);:INPUTF1$
2080 PRINTLEFT$(LS$,7);LEFT$(RS$,25);:INPUTF2$
2090 IFF2$="*"THEN2110
2100 F1=VAL(F2$):GOSUB2460:IFRP=1THENPRINT"⌝";:GOTO2080
2110 PRINTLEFT$(LS$,9);LEFT$(RS$,25);:INPUTF3$
2120 PRINTLEFT$(LS$,11);LEFT$(RS$,25);:INPUTF4$
2130 IFF4$="*"THEN2150
2140 F1=VAL(F4$):GOSUB2460:IFRP=1THENPRINT"⌝";:GOTO2120
2150 PRINTLEFT$(LS$,13);LEFT$(RS$,25);:INPUTF5$
2160 PRINTLEFT$(LS$,15);LEFT$(RS$,25);:INPUTF6$
2170 IFF6$="*"THEN2190
2180 F1=VAL(F6$):GOSUB2460:IFRP=1THENPRINT"⌝";:GOTO2170
2190 PRINTLEFT$(LS$,17);LEFT$(RS$,25);:INPUTF7$
2200 IFF7$="*"ORVAL(F7$)<0ORVAL(F7$)>999THENPRINT"⌝";:GOTO2190
2210 IFLEN(F7$)>3THENPRINT"⌝";:GOTO2190
2220 PRINTLEFT$(LS$,19);LEFT$(RS$,25);:INPUTF8$
2230 IFF8$="*"ORLEN(F8$)>3ORVAL(F8$)<0ORVAL(F8$)>999THENPRINT"⌝";:GOTO2220
2250 GOSUB2350
2260 GOSUB9050
2270 ONFGOTO2070,2290,2300
2280 GOTO2070
2290 VT$="":GOTO1400
2300 VT$=LEFT$(F1$+"0",1)+RIGHT$("00000"+F2$,5)+LEFT$(F3$+"0",1)
2305 VT$=VT$+RIGHT$("00000"+F4$,5)+LEFT$(F5$+"0",1)+RIGHT$("00000"+F6$,5)
2310 VT$=VT$+RIGHT$("000"+F7$,3)+RIGHT$("000"+F8$,3)
2320 GOTO1400
2350 PRINTLEFT$(LS$,3);"  V.A.T. RECORD"
2360 PRINTLEFT$(LS$,5);"VAT CODE                ▮▮▮";F1$
2370 PRINTLEFT$(LS$,7);"%                       ▮▮▮";F2$
2380 PRINTLEFT$(LS$,9);"VAT CODE                ▮▮▮";F3$
2390 PRINTLEFT$(LS$,11);"%                       ▮▮▮";F4$
2400 PRINTLEFT$(LS$,13);"VAT CODE                ▮▮▮";F5$
2410 PRINTLEFT$(LS$,15);"%                       ▮▮▮";F6$
2420 PRINTLEFT$(LS$,17);"VAT OUTPUT NOM. A/C NO. ▮▮▮";F7$
2430 PRINTLEFT$(LS$,19);"VAT  INPUT NOM. A/C NO. ▮▮▮";F8$
2440 RETURN
2460 RP=0:FY$=STR$(INT(F1*100)/100+.001)
2470 FX$=RIGHT$("000"+MID$(FY$,2,LEN(FY$)-2),5)
2480 IFVAL(FX$)>99.99ORVAL(FX$)<0THENRP=1
2490 RETURN
2500 REM
2505 AC=0
2510 AC=AC+1
2520 IFAC>SRTHENSR=AC:GOSUB9310:GOTO2560
2530 F1$=LEFT$(SR$(AC),4):F2$=MID$(SR$(AC),5,20)
2535 IFRIGHT$(F1$,1)=" "THENF1$=LEFT$(F1$,LEN(F1$)-1):GOTO2535
2537 IFRIGHT$(F2$,1)=" "THENF2$=LEFT$(F2$,LEN(F2$)-1):GOTO2537
2540 F3$=MID$(SR$(AC),25,20):F4$=MID$(SR$(AC),45,2)
2542 IFRIGHT$(F3$,1)=" "THENF3$=LEFT$(F3$,LEN(F3$)-1):GOTO2542
2546 IFRIGHT$(F4$,1)=" "THENF4$=LEFT$(F4$,LEN(F4$)-1):GOTO2546
```

```
2550 F5$=MID$(SR$(AC),47,2)
2552 IFRIGHT$(F5$,1)=" "THENF5$=LEFT$(F5$,LEN(F5$)-1):GOTO2552
2560 GOSUB2850
2570 PRINTLEFT$(LS$,3);RIGHT$(RS$,15);:INPUTF1$
2580 IFF1$="*"THENGOTO1400
2590 IFLEN(F1$)>4THENPRINT"⌉";:GOTO2570
2600 PRINTLEFT$(LS$,5);RIGHT$(RS$,15);:INPUTF2$
2650 IFF2$="*"ORLEN(F2$)>15THENPRINT"⌉";:GOTO2600
2660 PRINTLEFT$(LS$,7);RIGHT$(RS$,15);:INPUTF3$
2670 IFF2$="*"ORLEN(F3$)>15THENPRINT"⌉";:GOTO2660
2680 PRINTLEFT$(LS$,9);RIGHT$(RS$,15);:INPUTF4$
2690 IFF4$="*"ORVAL(F4$)>80ORVAL(F4$)<1THENPRINT"⌉";:GOTO2680
2700 PRINTLEFT$(LS$,11);RIGHT$(RS$,15);:INPUTF5$
2710 IFF5$="*"ORVAL(F5$)>80ORVAL(F5$)<1THENPRINT"⌉";:GOTO2700
2720 GOSUB2850
2730 GOSUB9050
2740 ONFGOTO2570,2760,2790
2760 FORI=ACTOSR
2770 SR$(I)=SR$(I+1):NEXT:SR$(SR)=""
2780 SR=SR-1:GOSUB9000:GOTO2510
2790 SR$=LEFT$(F1$+"    ",4)+LEFT$(F2$+SP$,20)
2800 SR$=SR$+LEFT$(F3$+SP$,20)+RIGHT$("0"+F4$,2)
2810 SR$(SR)=SR$+RIGHT$("0"+F5$,2)
2820 GOSUB9000:GOTO2510
2850 PRINTLEFT$(LS$,1);"  SORT CONTROL RECORD"
2860 PRINTLEFT$(LS$,3);"SORT NAME          ▌▌▌";F1$
2870 PRINTLEFT$(LS$,5);"INPUT FILE         ▌▌▌";F2$
2880 PRINTLEFT$(LS$,7);"OUTPUTFILE         ▌▌▌";F3$
2890 PRINTLEFT$(LS$,9);"START OF KEY       ▌▌▌";F4$
2900 PRINTLEFT$(LS$,11);"LENGTH OF KEY     ▌▌▌";F5$
2910 RETURN
3000 REM
3005 AC=0
3010 AC=AC+1
3020 IFAC>SCTHENSC=AC:GOSUB9310:GOTO3050
3030 F1$=LEFT$(SC$(AC),10)
3034 IFRIGHT$(F1$,1)=" "THENF1$=LEFT$(F1$,LEN(F1$)-1):GOTO3034
3040 F2$=MID$(SC$(AC),11,12)
3044 IFRIGHT$(F2$,1)=" "THENF2$=LEFT$(F2$,LEN(F2$)-1):GOTO3044
3050 GOSUB3220
3060 PRINTLEFT$(LS$,5);RIGHT$(RS$,18);:INPUTF1$
3070 IFF1$="*"THEN1400
3080 IFLEN(F1$)>10THENPRINT"⌉";:GOTO3060
3090 PRINTLEFT$(LS$,7);RIGHT$(RS$,18);:INPUTF2$
3100 IFLEN(F2$)<>12THENPRINT"⌉";:GOTO3090
3110 F=0:FORI=1TO12
3120 IFMID$(F2$,I,1)<"0"ORMID$(F2$,I,1)>"9"THENPRINT"⌉";:GOTO3090
3130 GOSUB3220
3140 GOSUB9050
3150 ONFGOTO3060,3170,3200
3170 FORI=ACTOSC
3180 SC$(I)=SC$(I+1):NEXT:SC$(SC)=""
3190 SC=SC-1:GOSUB9000:GOTO3010
3200 SC$(SC)=LEFT$(F1$+SP$,10)+F2$
3210 GOSUB9000:GOTO3010
3220 PRINTLEFT$(LS$,3);" SPECIAL SYMBOL RECORDS"
3230 PRINTLEFT$(LS$,5);"IDENTITY              ▌▌▌";F1$
3240 PRINTLEFT$(LS$,7);"PARAMETERS (6X2)  ▌▌▌";F2$
3250 RETURN
3300 REM
3310 IFTR$=""THENGOSUB9310:GOTO3350
3320 F1$=LEFT$(TR$,6):F2$=MID$(TR$,7,6)
3330 F3$=MID$(TR$,13,6):F4$=MID$(TR$,19,6)
3340 F5$=MID$(TR$,25,6)
3350 GOSUB3700
3360 PRINTLEFT$(LS$,5);LEFT$(RS$,6);:INPUTF1$
3370 IFF1$="*"ORLEN(F1$)=6THEN3390
3380 PRINT"⌉";:GOTO3360
3390 PRINTLEFT$(LS$,7);LEFT$(RS$,6);:INPUTF2$
3400 IFF2$="*"ORLEN(F2$)=6THEN3420
3410 PRINT"⌉";:GOTO3390
```

```
3420 PRINTLEFT$(LS$,9);LEFT$(RS$,6);:INPUTF3$
3430 IFF3$="*"ORLEN(F3$)=6THEN3450
3440 PRINT"┐";:GOTO3420
3450 PRINTLEFT$(LS$,11);LEFT$(RS$,6);:INPUTF4$
3460 IFF4$="*"ORLEN(F4$)=6THEN3480
3470 PRINT"┐";:GOTO3450
3480 PRINTLEFT$(LS$,13);LEFT$(RS$,6);:INPUTF5$
3490 IFF5$="*"ORLEN(F5$)=6THEN3510
3500 PRINT"┐";:GOTO3480
3510 GOSUB3700
3520 GOSUB9050
3530 ONFGOTO3360,3550,3570
3550 TR$="":GOTO1400
3570 IFF1$="*"THENF1$="******"
3580 IFF2$="*"THENF2$="******"
3590 IFF3$="*"THENF3$="******"
3600 IFF4$="*"THENF4$="******"
3610 IFF5$="*"THENF5$="******"
3620 TR$=F1$+F2$+F3$+F4$+F5$
3630 GOTO1400
3700 REM
3710 PRINTLEFT$(LS$,3);"TRANSACTION REFERENCE TABLE"
3720 PRINTLEFT$(LS$,5);"REF 1 ■■■";F1$
3730 PRINTLEFT$(LS$,7);"REF 2 ■■■";F2$
3740 PRINTLEFT$(LS$,9);"REF 3 ■■■";F3$
3750 PRINTLEFT$(LS$,11);"REF 4 ■■■";F4$
3760 PRINTLEFT$(LS$,13);"REF 5 ■■■";F5$
3770 RETURN
4000 REM
4010 OPEN2,8,2,"@1:PARAMETERS,SEQ,WRITE":IFST=0THEN4030
4020 EL=4010:GOSUB9220:IFRP=1THEN4010
4030 PRINT#2,"NAME";NM$;CHR$(13);:IFST<>0THENEL=4030:GOSUB9220
4040 PRINT#2,"VAT ";VT$;CHR$(13);:IFST<>0THENEL=4040:GOSUB9220
4050 FORI=1TOSR
4060 PRINT#2,"SORT";SR$(I);CHR$(13);:IFST<>0THENEL=4060:GOSUB9220
4070 NEXT
4080 FORI=1TOSC
4090 PRINT#2,"SPEC";SC$(I);CHR$(13);:IFST<>0THENEL=4090:GOSUB9220
4100 NEXT
4110 PRINT#2,"TRRF";TR$;CHR$(13);:IFST<>0THENEL=4110:GOSUB9220
4120 PRINT#2,"ZZZZ";CHR$(13);:IFST<>0THENEL=4120:GOSUB9220
4130 CLOSE2:IFST<>0THENEL=4130:GOSUB9220
4140 CLOSE15
4150 POKE42,010:POKE43,036:CLR:LOAD"0:NOMINAL MENU",8
9000 PRINT"┐NOM. LEDGER  PARAMETER FILE MAINTENANCE"
9010 RETURN
9050 PRINT:PRINT"ENTER 'S' TO SAVE"
9060 PRINT"       'A' TO AMEND"
9070 PRINT"       'D' TO DELETE"
9080 INPUT"CODE  S■■■";CD$
9090 F=0:FORI=1TO3
9100 IFCD$=MID$("ADS",I,1)THENF=I:I=3
9110 NEXT:IFF=0THENPRINT"┐";:GOTO9080
9120 RETURN
9220 REM
9230 INPUT#15,R1$,R2$,R3$,R4$
9250 RP=0:IFVAL(R1$)=0THENGOTO9300
9260 PRINT"┐■■DISC ERROR■"
9270 PRINT"ERROR TYPE :";R1$
9280 PRINT"       MSG  :";R2$,R3$,R4$
9290 PRINT"PROGRAM LINE NO. = ";EL
9300 IFVAL(R1$)=62THENPRINT"LOAD CORRECT DISC):GOTO9350
9310 F1$="*":F2$="*":F3$="*":F4$="*":F5$="*":F6$="*":F7$="*":F8$="*"
9320 RETURN
9330 IFYN$="Y"THEN9380
9340 END
9350 PRINT"ENTER 'G' WHEN READY"
9360 GETYN$:IFYN$<>"G"THEN9360
9370 RP=1
9380 RETURN
READY.
```



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```
10 REM*AMEND/CREATE NOMINAL DESCRIPTIONS FILE
100 DIMNA$(1000)
110 LS$="▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒"
120 RS$="▐▐▐▐▐▐▐▐▐▐▐▐▐▐▐▐▐▐▐▐▐▐▐▐▐▐▐▐▐▐▐▐▐▐▐▐▐▐▐▐"
140 SP$="                                         "
1000 PRINT"▭ AMEND NOMINAL DESCRIPTIONS FILE"
1020 PRINT"▒▒"
1030 INPUT"OPERATORS NAME     *■■■";OP$
1040 IFOP$="*"THENPRINT"▭";:GOTO1030
1050 INPUT"TODAY'S DATE     *■■■";TD$
1060 IFTD$="*"ORLEN(TD$)<>6THENPRINT"▭";:GOTO1050
1070 DD=VAL(LEFT$(TD$,2)):MM=VAL(MID$(TD$,3,2)):YY=VAL(RIGHT$(TD$,2))
1080 IFMM<1ORMM>12ORYY<79ORDD<1ORDD>31THENPRINT"▭";:GOTO1050
1090 OPEN15,8,15
1100 INPUT"IS THERE A B/F FILE (Y/N)    Y■■■";BF$
1110 IFBF$="N"THEN1210
1120 IFBF$<>"Y"THENPRINT"▭";:GOTO1100
1140 OPEN1,8,3,"1:NOMINALDESC,SEQ,READ":IFST=0THEN1160
1150 EL=1140:GOSUB9220:IFRP=1THEN1140
1160 INPUT#1,IR$:IFLEFT$(IR$,4)="ZZZZ"THENCLOSE1:GOTO1210
1170 IFST>0THENEL=1160:GOSUB9220
1180 I1$=RIGHT$(IR$,LEN(IR$)-7):MD=VAL(LEFT$(IR$,3)):CT=LEN(I1$)
1190 IFMID$(I1$,CT,1)=" "THENCT=CT-1:GOTO1190
1200 NA$(MD)=LEFT$(I1$,CT):GOTO1160
1210 F1$="*":F2$="*"
1220 PRINT"▭ AMEND NOMINAL DESCRIPTIONS FILE"
1230 PRINTLEFT$(LS$,3);"A/C NO. ('E' TO END) ▐■■";F1$
1250 PRINTLEFT$(LS$,3);RIGHT$(RS$,22);:INPUTF1$
1260 IFF1$="*"THENPRINT"▭";:GOTO1250
1270 IFF1$="E"THEN2000
1280 IFVAL(F1$)<0ORVAL(F1$)>999THENPRINT"▭";:GOTO1250
1282 F2$=NA$(VAL(F1$)):IFF2$=""THENF2$="*"
1285 PRINTLEFT$(LS$,5);"DESCRIPTION                     ▐■■";F2$
1290 PRINTLEFT$(LS$,5);LEFT$(RS$,22);:INPUTF2$
1300 IFLEN(F2$)>40THENPRINT"▭";:GOTO1290
1320 GOSUB9050
1330 ONFGOTO1220,1340,1350
1340 NA$(VAL(F1$))="":GOTO1210
1350 NA$(VAL(F1$))=F2$:GOTO1210
2000 OPEN2,8,2,"@1:NOMINALDESC,SEQ,WRITE":IFST=0THEN2020
2010 EL=2000:GOSUB9220:IFRP=1THEN2000
2020 FORI=0TO999
2025 IFNA$(I)=""THEN2050
2030 IR$=RIGHT$(STR$(1000+I),3)+"ND01"+LEFT$(NA$(I)+SP$,40)
2040 PRINT#2,IR$;CHR$(13);
2050 NEXT
2060 PRINT#2,"ZZZZ";CHR$(13);
2070 CLOSE2
2080 GOTO9340
9050 PRINT:PRINT"ENTER 'S' TO SAVE"
9060 PRINT"      'A' TO AMEND"
9070 PRINT"      'D' TO DELETE"
9080 INPUT"CODE  S■■■";CD$
9090 F=0:FORI=1TO3
9100 IFCD$=MID$("ADS",I,1)THENF=I:I=3
9110 NEXT:IFF=0THENPRINT"▭";:GOTO9080
9120 RETURN
9220 REM
9230 INPUT#15,R1$,R2$,R3$,R4$
9250 RP=0:IFVAL(R1$)=0THENGOTO9380
9260 PRINT"▭▒▒DISC ERROR▒"
9270 PRINT"ERROR TYPE :";R1$
9280 PRINT"       MSG  :";R2$,R3$,R4$
9290 PRINT"PROGRAM LINE NO. = ";EL
9300 IFVAL(R1$)=62THENPRINT"LOAD CORRECT DISC):GOTO9350
9310 IFVAL(R1$)=63THENPRINT"REMOVE DISC AND LOAD CORRECT DISC":GOTO9350
9320 INPUT"CONTINUE ? (Y/N)    N■■■";YN$
9330 IFYN$="Y"THEN9300
9340 POKE42,010:POKE43,036:CLR:LOAD"0:NOMINAL MENU",8
9350 PRINT"ENTER 'G' WHEN READY"
9360 GETY1$:IFY1$<>"G"THEN9360
9370 RP=1
9380 RETURN
```

BASIC PROGRAMMING

Card player

PET

Another collection of utilities (and a game or two) for all owners of Commodore computers, whether your own disk drives, printers, or just a stand-alone machine with a humble tape deck.

Taking the PET family of programs first, we start off with the inevitable game, based on the popular Bruce Forsyth television show 'Play Your Cards Right.' Whether you like the television program or not, the computer program will provide a few hours of fun and amusement, and possibly some ideas for other programs of your own as well.

In particular, one is thinking here, of the card shuffling (lines 35-50) and dealing (lines 55-64, with a subroutine at lines 1000 onwards) routines, which could really be incorporated into any card playing game, be it poker, black jack or whatever.

The program, as written, is designed for a 40 column PET, equipped with either Basic 1.0, 2.0 or 4.0. Basic 1 owners will have to be careful about Upper/Lower case and Graphics.

The card drawings (lines 2000-2112), whilst lacking the sophisticated graphics that could be achieved with a Commodore 64 or a VIC 20, at least makes the cards distinguishable from each other, and this is an area that could be improved if you were thinking of adapting these programs for use on either of those two machines.

If you're a VIC 20 owner, adaption would be rather difficult, since the majority of the graphic movement is POKE-ed' to the screen, and of course both the VIC 20 and the Commodore 64 have different screen start addresses to the 40 column PET, this was originally written for. With the VIC 20 having a 22 character wide screen, it would probably be easier to re-write the program from scratch, using just the card manipulation routines mentioned earlier.

For those of you with a Commodore 64, life is a lot simpler. You'll have to add your own sound, but conversion of the graphics routines should be a fairly straightforward task.

The variables SP and SC, defined in line 30, dictate the final position of all the graphical displays on the screen. Bearing in mind that the PETs screen memory starts at 32768, and the 64s at 1024, changing these values respectively to SP=1184 and SC=1584, should solve all your problems.

```
0 REM*** CARD PLAYER BY GRAHAM JONES ***
1 REM***BASED ON THE  POPULAR TV GAME***
2 PRINT"❐":GOTO15
5 GETA$:IFA$=""THEN5
10 RETURN
15 PRINTTAB(13)"▚                    ":PRINTTAB(13)"▚  PLAY YOUR   ":PRINTTAB(13);
20 PRINT"▚                    ":PRINTTAB(13)"▚ CARDS RIGHT ":PRINTTAB(13)"▚
 "
25 PRINT"▙▙▙DO YOU REQUIRE INSTUCTIONS (Y OR N)▙":GOSUB5:IFA$="Y"THENGOTO300
26 IFA$<>"N"THENPRINT"▔▔▔▔▔";:GOTO25
30 DIMFL(52),D%(52),C(52):SP=32928:SC=33328:M=75:L=5
33 REM***SHUFFLE & DEAL***
35 PRINT"SHUFFLING THE PACK"
40 X=RND(-TI):FORI=1TO52
45 C%=52*RND(1)+1:IFFL(C%)<>0GOTO45
50 D%(I)=C%:FL(C%)=1:NEXT
55 PRINT"❐DEALING CARDS"
60 S=SC:FORQ=1TO5:GOSUB1000:S=S+8:NEXT:S=SP+8:FORQ=1TO4:GOSUB1000:S=S+8:NEXT
64 D=1:S=SC:GOSUB2000
65 GOSUB500:PRINT"FIRST CARD IS A"M$:PRINT"DO YOU WISH TO CHANGE"
66 PRINT"THIS CARD (Y OR N)":GOSUB5:IFA$="N"THEN70
67 IFA$<>"Y"THEN65
68 D=D+1:L=L+1:FORJ=1TO9:FORI=0TO7:POKES+I,32:NEXTI:S=S+40:NEXT:S=SC
69 GOSUB1000:GOSUB2000
70 GOSUB500:PRINT"YOU HAVE"M"POINTS & CARD IS A"M$
71 PRINT"WHAT IS YOUR BET(MIN.10)";:B$=""
72 GOSUB5:IFA$<>" "THENB$=B$+A$:PRINT"▟▟▟";B$;:GOTO72
73 B=VAL(B$):PRINT" ";:GOSUB5:PRINTA$
79 IFB<10ORB>MTHEN90
80 IFA$="H"ORA$="L"THEND=D+1:S=S+8:GOSUB2000:GOTO95
90 GOSUB500:PRINT"TRY AGAIN":FORI=1TO1000:NEXT:GOTO70
95 IFA$="H"ANDC(D-1)<C(D)THENM=M+B:GOTO115
100 IFA$="L"ANDC(D-1)>C(D)THENM=M+B:GOTO115
105 IFC(D-1)=C(D)THENGOSUB500:PRINT"NOTHING FOR A PAIR":FORI=1TO1000:NEXT
110 M=M-B
115 IFM>=10THENIFD<LGOTO70
120 IFM<10THENGOSUB500:GOTO185
125 IFD>6THEN160
126 GOSUB500:PRINT"CARD IS A"M$:PRINT"DO YOU WISH TO CHANGE"
130 PRINT"THIS CARD(Y OR N)":GOSUB5:IFA$="Y"THEND=D+1:GOTO150
135 IFA$<>"N"THEN125
```

BASIC PROGRAMMING

```
140 FORJ=1TO9:FORI=0TO7:POKES+I,32:NEXTI:S=S+40:NEXT:L=L-1
150 S=SP:GOSUB1000:GOSUB2000:L=L+5:M=M+200:GOTO70
160 GOSUB500:PRINT"YOU SCORED "M" POINTS"
162 IFM=>4000THENPRINT"WOW!! ";
165 IFM=>3000THENPRINT"DIDN'T YOU DO WELL":GOTO190
170 IFM=>2000THENPRINT"NOT BAD!!":GOTO190
175 IFM=>1000THENPRINT"BETTER LUCK NEXT TIME":GOTO190
180 IFM=>500THENPRINT"HARD LUCK!!":GOTO190
185 PRINT"AH WELL! WHY DID YOU BOTHER PLAYING"
190 FORI=1TO2000:NEXT
195 PRINT"DO YOU WANT ANOTHER GAME (Y OR N)":GOSUB5:IFA$="Y"THENRUN30
200 IFA$<>"N"THENPRINT"]";:GOTO195
210 PRINT"]THANKS FOR PLAYING":END
300 PRINT"]PLAY YOUR CARDS RIGHT":PRINT"————————————————————————"
302 PRINT"BASED ON THE TELEVISION GAME THE OBJECT"
305 PRINT"IS TO SCORE AS MANY POINTS AS YOU CAN"
310 PRINT"BY BETTING THAT THE NEXT CARD TURNED
315 PRINT"OVER WILL BE HIGHER OR LOWER THAN THE
320 PRINT"CARD LAST DISPLAYED. AT THE END OF THE
325 PRINT"FIRST LINE 200 IS ADDED TO YOUR SCORE
330 PRINT"AND AT THE END OF THE SECOND LINE YOUR
335 PRINT"TOTAL POINTS AND A SUITABLE COMMENT AS
340 PRINT"TO YOUR PERFORMANCE WILL BE DISPLAYED."
345 PRINT"▓REMEMBER■:-IF YOUR POINTS ARE LESS THAN"
347 PRINT"10 THE GAME WILL END!!!"
350 PRINT"YOU START WITH 75 POINTS AND THE MINIMUM";
355 PRINT"BET IS 10 POINTS, YOU MAY CHANGE THE
360 PRINT"FIRST CARD IF YOU WISH TO."
365 PRINT"ЖENTER BET AS FOLLOWS :- ":PRINT"ЖAMOUNT <SPACE> H OR L"
370 PRINT"ЖEG. 50 L OR 125 H ETC."
375 PRINT"Ж▓PRESS ANY KEY TO START":GOSUB5:PRINT"]":GOTO30
500 REM***MESSAGE PAD CLEAR***
505 PRINT"§                                      "
510 PRINT"                                       "
515 PRINT"                                      §";
520 RETURN
1000 REM***BLANK CARD DRAW***
1005 POKES,85:FORI=1TO5:POKES+I,64:NEXT:POKES+6,73
1010 FORI=1TO7:S=S+40:POKES,93:POKES+6,93:NEXT:S=S+40
1015 POKES,74:FORI=1TO5:POKES+I,64:NEXT:POKES+6,75
1020 S=S-320:RETURN
2000 REM***CARD DRAW DETAIL***
2005 IFD%(D)<14THENC(D)=14-D%(D):N=83:GOTO2025
2010 IFD%(D)<27THENC(D)=27-D%(D):N=88:GOTO2025
2015 IFD%(D)<40THENC(D)=40-D%(D):N=90:GOTO2025
2020 C(D)=53-D%(D):N=65
2025 C=C(D):C$=STR$(C)
2028 IFC<>2THENPOKES+41,N:POKES+285,N
2030 IFC>3ANDC<11THENPOKES+45,N:POKES+281,N
2035 IFC=3ORC=5ORC=7ORC=9THENPOKES+163,N
2040 IFC=6ORC=7THENPOKES+161,N:POKES+165,N
2045 IFC=8ORC=9ORC=10THENPOKES+121,N:POKES+125,N:POKES+201,N:POKES+205,N
2050 IFC=2ORC=10THENPOKES+83,N:POKES+243,N
2055 IFC>10ORC=1THENPOKES+202,102:POKES+242,102:POKES+245,102
2060 IFC>10THENPOKES+85,102
2065 IFC>11THENPOKES+82,102
2070 IFC=1ORC>11THENPOKES+122,102:POKES+162,102:POKES+204,102
2075 IFC=1ORC=11ORC=12THENPOKES+125,102:POKES+165,102
2080 IFC=1ORC=12THENPOKES+83,102:POKES+84,102
2085 IFC=11ORC=12THENPOKES+243,102
2090 IFC=1ORC=11THENPOKES+205,102
2095 IFC=1THENPOKES+203,102
2100 IFC=11THENPOKES+244,102
2105 IFC=13THENPOKES+124,102:POKES+163,102
2106 IFC=1THENM$="N ACE":C(D)=14:GOTO2112
2107 IFC=11THENM$=" JACK":GOTO2112
2108 IFC=12THENM$=" QUEEN":GOTO2112
2109 IFC=13THENM$=" KING":GOTO2112
2110 M$=C$:IFC=8THENM$="N"+C$
2112 RETURN
```

PET

Screen Jotter & Dump to Disk

The idea for the program came to me whilst developing a program for storing student records on the PET and I wanted to enable staff not experienced in wordprocessors to plan screen layouts with the minimum of fuss.

The program will allow the user to create a screen display (or amend an existing display on disk) under program control using all the cursor control keys as normally allowed by the PET screen editing facilities, with no restrictions on any key pressed including the use of the return key without invoking 'syntax error' say for example when typing text in without a line number.

When the display has been created pressing 'shift space' followed by 'return' will save the screen contents to disk in drive 0 under the file name originally chosen by the user. To recall the display the following line of BASIC is incorporated into the user program at the appropriate point:

10000 dopen#5, 'filename ":sys62294:dclose#5

If an existing screen display requires changing it can be recalled from disk using the enclosed program, the necessary changes made and then the display re-saved to disk under the same filename.

The program as written is for 40/80 column PETS – basic 4. The machine code segment which handles the screen layout is in data statements and on running the program these are poked into line number 20 behind the rem statement.

DO NOT change the program, in particular lines prior to and including line number 200, as this could change the position of memory locations important to the running of the program. DO NOT be tempted to change parts of the program which you think could work better in another way eg: 'dsave" " to 'dsave (fl$)' as when the basic pointers are changed to point to screen memory the basic interpreter cannot find fl$ because it is looking in the wrong place.

Some error checking for program entry has been incorporated into the program, but to be on the safe side, before running save it to disk and save your blood pressure rising at the same time if anything unforseen has gone wrong.

In line number 10 there are 36 'stars,' in line number 200 there are 16 'blanks.'

Best of luck and happy programming!!!!

```
10 goto60000
20 rem "************************************"
100 printcc$:sys(sy)::rem user screen layout routine
110 :
120 ::rem::save pointers to start and end of basic
130 j=40:fori=1070to1073:pokei,peek(j):j=j+1:next
140 ::
150 ::
160 ::rem fool pet into thinking program = screen memory
170 poke40,0:poke41,128::::rem start of screen
180 poke42,peek(1074):poke43,peek(1075)::::rem end of screen
190 ::
200 dsave"                ":: rem  perform save to disk
210 ::rem        line numbers upto and including 200 must
220 ::rem        be typed in exactly as listing
230 ::
240 ::rem restore original basic pointers
250 poke40,peek(1070):poke41,peek(1071)
260 poke42,peek(1072):poke43,peek(1073)
270 ::
280 ::rem restore 'stars' into temporary store in line 20
290 :
300 fori=1070to1078:pokei,42:next
310 ::
320 ::rem restore 'blanks' into file name at line 200
330 fori=1387to1402:pokei,32:next:::rem 16 blanks
340 goto20000
350 ::
10000 cc$=cl$:::rem create new screen layout
10010 gosub40000:iffl$="."then21000
10020 ifer=63thengosub44000:ifz$="n"then10010
10030 gosub45030:goto100
10040 :
11000 cc$=ho$:::rem change existing layout
11010 gosub40000:iffl$="."then21000
11020 ifer=62thengosub46000:goto11010
```

```
11030 gosub45030:goto100
11040 :
12000 cc$=ho$:::rem change existing layout resave new name
12010 gosub40000:iffl$="."then21000
12020 ifer=62thengosub46000:goto12010
12030 gosub41000:ifnf$="."then21000
12040 ifer=63thengosub44000:ifz$="n"then12030
12050 gosub43010:fl$=nf$:gosub45030:goto100
12060 :
13000 cc$=cl$:::rem view existing layout
13010 gosub40000:iffl$="."then21000
13020 ifer=62thengosub46000:goto13010
13030 gosub43010
13040 gosub50000:goto21000
13050 :
13060 :
19999 ::rem instructions
20000 printcl$tab(10)r1$"INSTRUCTIONS"cr$cr$
20010 print"When screen clears and flashing prompt
20020 print"appears type in your screen layout.
20030 printcd$"To save the screen to disk press
20040 print"'shift space' followed by 'return'"
20050 printcd$cd$"To start program press 'return'"
20060 gosub50000:ifz$<>chr$(13)then20060
20070 :
20999 ::rem menu
21000 printcl$"*****  MENU  *****"cd$cr$
21010 print"1. Create new screen layout"cr$
21020 print"2. Change existing screen layout"cr$
21030 print"3. Change screen layout under new name"cr$
21040 print"4. View existing screen layout"cr$
21050 print"5. TERMINATE"cr$
21060 printcr$"Choose .... 1 - 5"
21070 gosub50000:ch=val(z$)
21080 printcl$:onchgoto10000,11000,12000,13000,30000:goto21000
21090 ::
30000 dclose:end
30010 ::
40000 print"Name of file"q$;:inputfl$:iffl$="."thenreturn
40010 cf$=fl$:gosub42010:fl$=cf$
40020 return
40030 ::
41000 printcr$"New file name"q$;:inputnf$:ifnf$="."thenreturn
41010 cf$=nf$:gosub42010:nf$=cf$
41020 return
41030 ::
42000 ::rem padding name to 16
42010 cf$=left$(cf$+"                ",16)::rem ensuring name not > 16
42020 ::rem check if file exists
42030 dopen#5,(cf$):er=ds:er$=ds$:dclose
42040 ifer<>0ander<>62ander<>63thenprinter$:goto30000
42050 return
42060 ::
43000 ::rem recall existing screen display
43010 dopen#5,(fl$):sys62294:dclose:return
43020 :
44000 printcd$r1$"File exists"r0$" Scratch   y/n"
44010 gosub50000:ifz$<>"y"andz$<>"n"then44010
44020 ifz$="y"thenscratch(cf$)
44030 return
45000 ::rem poking file name into blanks after dsave
45010 ::rem otherwise when pointers are changed basic
45020 ::rem will not find fl$
45030 j=1:k=1387:l=k+len(fl$)-1:fori=ktol
45040 pokei,asc(mid$(fl$,j,1)):j=j+1:next
45050 return
45060 :
46000 printcd$r1$"File does not exist"r0$
46010 return
```

```
46020 :
50000 getz$:ifz$=""then50000
50010 return
50020 :
60000 cl$=chr$(147):cd$=chr$(17):bl$=chr$(32):le$=chr$(157)
60010 r1$=chr$(18):r0$=chr$(146):cr$=chr$(13)
60020 q$=bl$+bl$+bl$+chr$(46)+le$+le$+le$
60030 printcl$:fori=1to90:printbl$;:next:type=peek(216):printcl$
60040 sy=1043:p1=232:p2=131:iftype=2thenp1=208:p2=135
60050 poke59468,14
60060 ::
61000 ::rem checking that lines upto 200 are correct
61010 ifpeek(1384)*256+peek(1383)=200then61040
61020 printcl$r1$"error"r0$" in program entry"cr$
61030 print"check typing against listing":goto30u00
61040 ifpeek(1402)=32andpeek(1387)=32then62020
61050 goto61020
62000 ::
62010 ::rem save top of screen pointers
62020 poke1074,p1:poke1075,p2
62030 ::
62040 ::rem poking machine code into line 20
62050 fori=1043to1068:reada:t=t+a:pokei,a:next
62060 ::
62070 ::rem checking data statements are correct
62080 ift=3820then20000
62090 ::
62100 ::rem restoring line 20 back to 'stars' if incorrect
62110 fori=1043to1068:pokei,42:next
62120 ::
62130 printcl$r1$"Data statements incorrect"r0$cr$
62140 print"Please check and re-run"
62150 goto30000
62160 ::
63500 ::type in the program exactly as printed
63510 ::particularly to line number 210. when the program
63520 ::has run all lines from these instructions can be
63530 ::deleted and the program resaved
63540 ::line #10 = 36 'stars'. line # 200 = 16 'blanks'
63700 :
63720 data 169,14,133,86,198,86,32,207,255,197,86,208
63730 data 5,165,86,32,210,255,201,160,208,240,32,204,255,96
63740 ::
63790 :::::::::: menu for lazy disk save & listing
63800 ::::::print:print"1. save on disk
63810 ::::::print"2. listing
63820 ::::::print"3. re-run
63830 ::::::print"4. terminate"
63840 ::::::gosub50000:onval(z$)goto63920,63930,63860
63850 dclose:end
63860 run
63900 :::::::::: lazy disk save & listing :::::::
63910 :
63920 ::::::scratch"screensave":dsave"screensave":goto63800
63930 ::::::open7,4,7:print#7:close7
63940 ::::::open4,4:print#4,chr$(147)chr$(1)"SCREEN SAVE"
63950 ::::::input"date";da$:print#4:print#4,"D.Milnes......"da$
63960 ::::::print#4:cmd4:list
63970 ::
63988 :::::::::::::::::::::::::::::::::::::
63989 :d.milnes    january 25 1983       :
63990 :13 delmont close                  :
63991 :whitelee rd                       :
63992 :batley                            :
63993 :west yorkshire                    :
63994 :::                                :
63995 ::: basic 4.... 40/80 column pet   :
63996 :::                                :
63997 :::::::::::::::::::::::::::::::::::::
```

High Resolution Printouts on the PET

"This month we have a useful article on H ires plotting by Anthony W. Bovill."

The program will plot up to five single-valued functions simultaneously, using separate programmed characters for each, and printed to the full resolution across the paper, i..e. to the nearest 1⁄60th of an inch. Alternatively, the program will plot one double valued function, i.e. one in which there are two values of 'y' for each value of 'x.'

The program requires the user to enter the relevant equations as a subroutine, using Y(1) to Y(5) for the ordinate values of s/v functions, or Y(0) and Y(1), for a d/v function. In either case the abscissa independent variable is X, and is assumed to change by equal increments, as defined by the programmed paper feed.

For graph plotting, entry is required of the following:

1. Initial and final values of X.
2. Either, a) the increment for X.

or b) the number of points to be plotted.

3. Printer model – 2022 or 4022.
4. Paper feed in points per inch.

On being run the program lists the subroutine (so you know what is being plotted). This is followed by a 'GOTO,' which initiates the program proper.

The program computes all the Y values to find the upper value YU (greater than 0) and the lower value YL (less than 0). Having found the range in Y the program automatically selects the scale (out of seven) which ensures the plot spans not less than 65% of the full scale. It selects the appropriate scale factors and abscissa position and assembles the scale numbers (note that each scale can commence anywhere from minus full scale value, to 0).

The program prints out the scale factors for abscissa and ordinate, prints the scale, the initial value of X and then proceeds to plot. During plotting a '0' is placed at the origin, and after plotting, the final value of X is printed. If more than one s/v function is plotted, then the program prints the character designation for each Y(N), thus enabling each plot to be identified.

At the end of plotting, the option is provided of having a table of all the computed points printed.

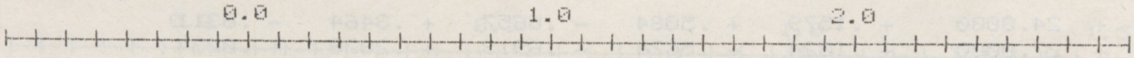
```
 150 A=X*π/180
 160 Y(2)=125*SIN(A):Y(3)=-70*SIN(3*A):Y(4)=40*SIN(5*A):Y(5)=-15*SIN(7*A)
 170 Y(1)=Y(2)+Y(3)+Y(4)+Y(5)
 190 RETURN

READY.

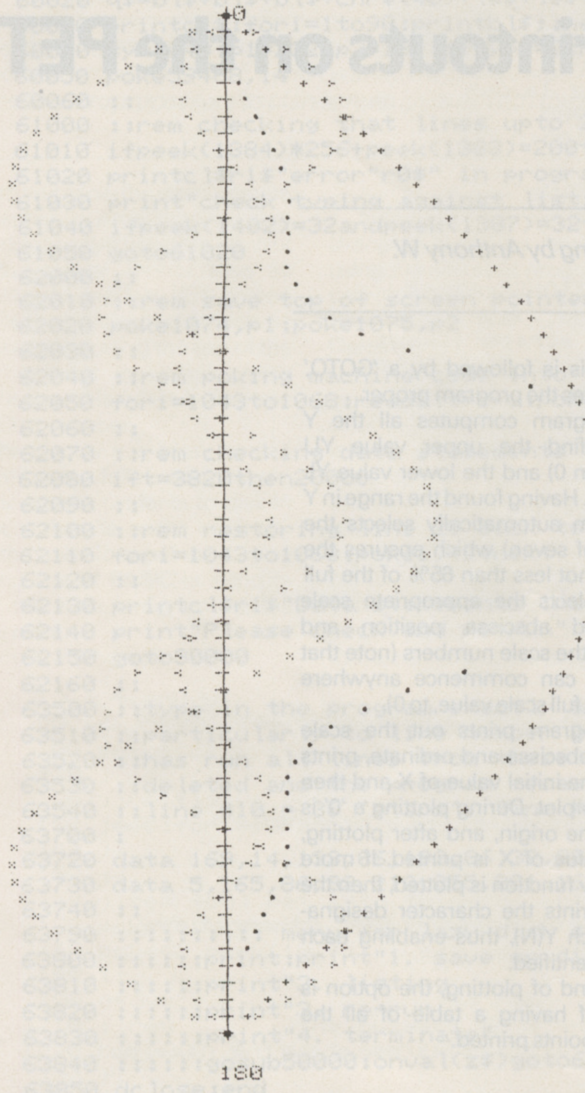
         ABSCISSA SCALE - ONE DIVISION = 3 UNITS
                        - ONE DIVISION = 1 PLOTTED POINT

         MULTIPLY ORDINATE SCALE BY 100

                  0.0                   1.0                   2.0
```



```
                  0
```



```
   Y(1) =         Y(2) = +     Y(3) = ×     Y(4) = >      Y(5) = <

      X          Y(1)         Y(2)         Y(3)         Y(4)         Y(5)

+    .0000     + .0000     + .0000     + .0000     + .0000     + .0000
+   3.0000     + .0056     + .0654     - .1095     + .1035     - .0537
+   6.0000     + .0139     + .1306     - .2163     + .2000     - .1003
+   9.0000     + .0269     + .1955     - .3177     + .2828     - .1336

+  12.0000     + .0456     + .2598     - .4114     + .3464     - .1491
+  15.0000     + .0700     + .3235     - .4949     + .3863     - .1448
+  18.0000     + .0986     + .3862     - .5663     + .4000     - .1213
+  21.0000     + .1289     + .4479     - .6237     + .3863     - .0816

+  24.0000     + .1579     + .5084     - .6657     + .3464     - .0311
+  27.0000     + .1824     + .5674     - .6913     + .2828     + .0234
+  30.0000     + .2000     + .6250     - .7000     + .2000     + .0749
+  33.0000     + .2095     + .6807     - .6913     + .1035     + .1165
+  36.0000   + .2116   + .7347   - .6657   + .0000   + .1426
+  39.0000   + .2092   + .7866   - .6237   - .1035   + .1497
+  42.0000   + .2071   + .8364   - .5663   - .2000   + .1370
+  45.0000   + .2121   + .8838   - .4949   - .2828   + .1060

+  48.0000   + .2320   + .9289   - .4114   - .3464   + .0610
+  51.0000   + .2751   + .9714   - .3177   - .3863   + .0078
+  54.0000   + .3486   +1.0112   - .2163   - .4000   - .0463
+  57.0000   + .4580   +1.0483   - .1095   - .3863   - .0943

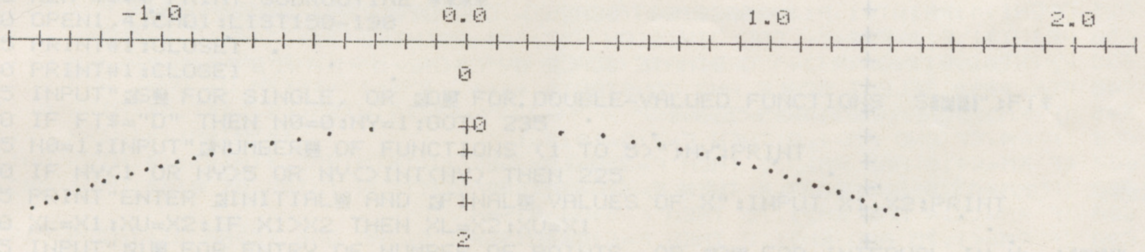
+  60.0000   + .6062   +1.0825   + .0000   - .3464   - .1299
+  63.0000   + .7922   +1.1137   + .1095   - .2828   - .1481
+  66.0000   +1.0115   +1.1419   + .2163   - .2000   - .1467
```

```
 150 A=100*X
 160 Y(1)=SQR(A)
 170 Y(0)=-SQR(A)
 190 RETURN

READY.
```

```
          ABSCISSA SCALE - ONE DIVISION = .6 UNITS
                         - ONE DIVISION = 6 PLOTTED POINTS

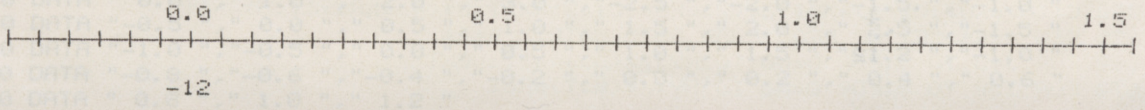
          MULTIPLY ORDINATE SCALE BY 10
```

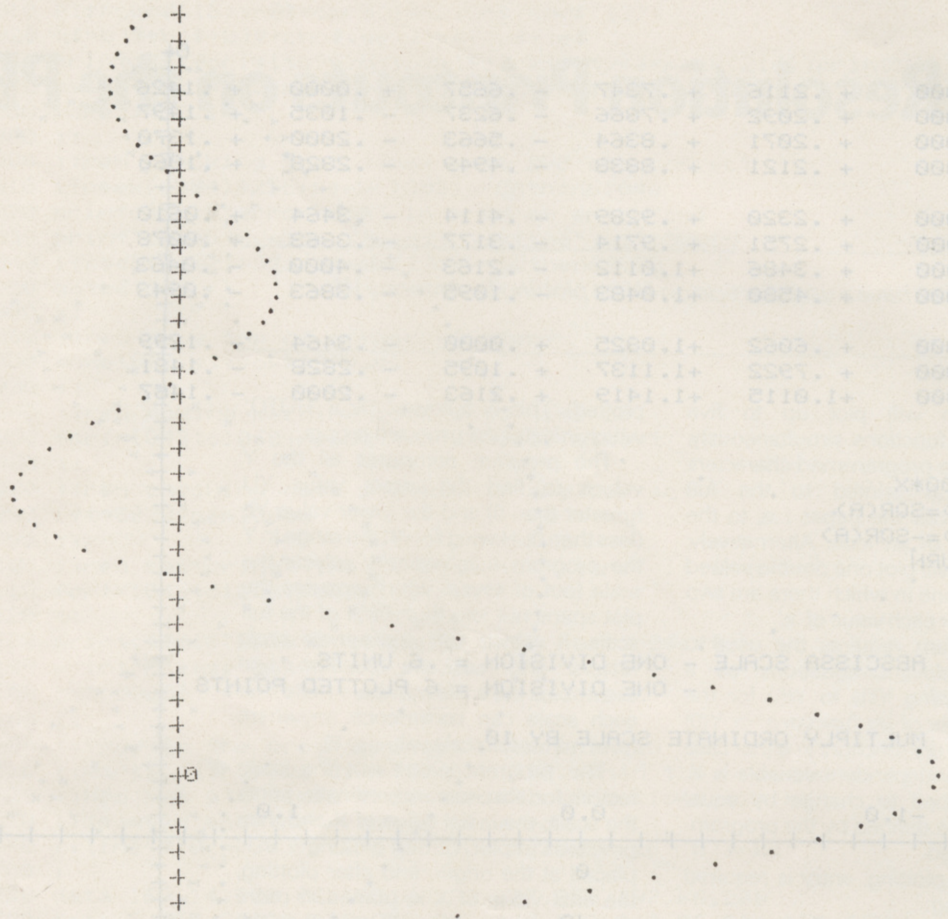


```
 150 IF X=0 THEN Y(1)=.125:GOTO 190
 160 Y(1)=.125*SIN(X)/X
 190 RETURN
READY.
```

```
          ABSCISSA SCALE - ONE DIVISION = .4 UNITS
                         - ONE DIVISION = 2 PLOTTED POINTS

          DIVIDE ORDINATE SCALE BY 10
```




0
12

BASIC PROGRAMMING

```
10 OPEN1,4:PRINT#1,"    A.W.B"TAB(22)"GRAPH PLOT 2"TAB(22)"19 JAN 1983"
20 A$="THIS PROGRAM  PLOTS EITHER ONE DOUBLE-VALUED  FUNCTION,  OR UP TO FIVE"
22 B$="SINGLE-VALUED  FUNCTIONS, OF ONE INDEPENDENT  VARIABLE 'X', USING  THE"
24 C$="LENGTH OF THE PAPER AS  ABSCISSA AND THE WIDTH AS  ORDINATE.  PLOTTING"
26 D$="MAKES USE OF THE FULL RESOLUTION OF THE PRINTER, POSITIONING POINTS TO"
28 E$="1/60TH OF AN INCH."
30 F$="THE USER MUST ENTER THE FUNCTION(S) AS A SUBROUTINE,  BEGINING ON LINE"
32 G$="150 AND ENDING WITH 'RETURN', ON LINE 190. FOR DOUBLE-VALUED FUNCTIONS"
34 H$="'Y' VALUES ARE ENTERED AS VARIABLES 'Y(0)' AND 'Y(1)', AND FOR SINGLE-"
36 I$="VALUED FUNCTIONS AS  'Y(1)' TO 'Y(5)'.  AFTER ENTRY OF THE SUBROUTINE,"
38 J$="THE PROGRAM SHOULD BE RUN FROM LINE 200, FOLLOWED BY 'GO TO' LINE 210."
40 K$="THE PROGRAM CALLS FOR FIVE INPUTS, NAMELY THE TYPE OF PLOT,  THE FIRST"
42 L$="AND LAST VALUES OF 'X',  EITHER THE NUMBER  OF POINTS TO BE PLOTTED OR"
44 M$="THE PLOTTING  INTERVAL IN 'X'  AND  FINALLY,  THE PAPER FEED IN POINTS"
46 N$="PER INCH."
48 O$="WHEN PLOTTING IS FINISHED THE USER HAS THE OPTIONS, EITHER OF PRINTING"
50 P$="OUT THE PLOTTED VALUES, OR OF PLOTTING NEWLY DEFINED FUNCTIONS."
52 S$="    ":T$=S$+S$
55 PRINT#1:PRINT#1:PRINT#1,S$+A$+T$+B$+T$+C$:PRINT#1,S$+D$+T$+E$:PRINT#1
60 PRINT#1,S$+F$+T$+G$+T$+H$:PRINT#1,S$+I$+T$+J$:PRINT#1:PRINT#1
70 PRINT#1,S$+K$+T$+L$+T$+M$:PRINT#1,S$+N$:PRINT#1:PRINT#1,S$+O$+T$+P$
80 PRINT#1:PRINT#1:PRINT#1:CLOSE1
90 INPUT"▒S▒ FOR SINGLE, OR ▒D▒ FOR DOUBLE VALUED FUNCTIONS  S▒▒▒";FT$
95 PRINT:IF FT$<>"D" AND FT$<>"S" THEN 90
110 AA$="FROM LINE 150 WRITE SUBROUTINE DEFINING 'Y(0)' AND 'Y(1)' "
115 BB$="FROM LINE 150 WRITE SUBROUTINE DEFINING 'Y(1)' TO 'Y(5)' "
120 CC$="AS FUNCTIONS OF 'X'.   THEN 'RUN' FROM LINE 200, THEN FROM LINE 210."
125 DD$="150 Y(0)= A FUNCTION OF X:Y(1)= A FUNCTION OF X ?"
130 EE$="150 Y(1)= A FUNCTION OF X:Y(2)= A FUNCTION OF X, ETC ?"
135 IF FT$="D" THEN PRINT AA$+CC$:PRINT:PRINT DD$:PRINT"190 RETURN":STOP
140 IF FT$="S" THEN PRINT BB$+CC$:PRINT:PRINT EE$:PRINT"190 RETURN":STOP
150 IF X=0 THEN Y(1)=.125:GOTO 190
160 Y(1)=.125*SIN(X)/X
190 RETURN
195 REM **** PRINT SUBROUTINE ****
200 OPEN1,4:CMD1:LIST150-190
205 PRINT#1:CLOSE1
210 PRINT#1:CLOSE1
215 INPUT"▒S▒ FOR SINGLE, OR ▒D▒ FOR DOUBLE-VALUED FUNCTIONS  S▒▒▒";FT$
220 IF FT$="D" THEN N0=0:NY=1:GOTO 235
225 N0=1:INPUT"▒NUMBER▒ OF FUNCTIONS (1 TO 5)";NY:PRINT
230 IF NY<1 OR NY>5 OR NY<>INT(NY) THEN 225
235 PRINT"ENTER ▒INITIAL▒ AND ▒FINAL▒ VALUES OF X":INPUT X1,X2:PRINT
240 XL=X1:XU=X2:IF X1>X2 THEN XL=X2:XU=X1
245 INPUT"▒1▒ FOR ENTRY OF NUMBER OF POINTS, OR ▒2▒ FOR INTERVAL IN X  1▒▒▒";AA
250 PRINT:IF AA<>1 AND AA<>2 THEN GOTO 245
255 IF AA=1 THEN INPUT"ENTER ▒NUMBER▒ OF POINTS";N:PRINT:XI=(XU-XL)/N:GOTO 265
260 INPUT"ENTER ▒INTERVAL▒ IN 'X'";XI:PRINT:N=INT((XU-XL)/XI+.5)
265 INPUT"▒4▒ FOR 4022 PRINTER, OR ▒2▒ FOR 2022  4▒▒▒";PT:PRINT
270 IF PT<>2 AND PT<>4 THEN 265
280 INPUT"▒PAPER FEED▒ IN POINTS/INCH - 4,6(NORMAL),8,9,12,18,24,36  6▒▒▒";PI
290 IL=144:IF PT=4 THEN IL=216
295 PRINT:PRINT"                     ▒WAIT▒":PRINT
300 IF IL/PI>INT(IL/PI) OR PI<4 OR PI>36 THEN 280
302 Z=1:IF PI>9 AND PI<18 THEN Z=2
304 IF PI>12 AND PI<36 THEN Z=3
306 IF PI>24 THEN Z=6
310 DIM YY(NY,N),S$(7,13),I$(NY,5),J$(NY,5)
315 REM **** SCALE NUMBERING DATA ****
320 DATA " -10 ","-8.0 ","-6.0 ","-4.0 ","-2.0 "," 0.0 "," 2.0 "," 4.0 "
330 DATA " 6.0 "," 8.0 ","  10 ","-6.0 ","-4.0 ","-2.0 "," 0.0 "," 2.0 "
340 DATA " 4.0 "," 6.0 ","-5.0 ","-4.0 ","-3.0 ","-2.0 ","-1.0 "," 0.0 "
350 DATA " 1.0 "," 2.0 "," 3.0 "," 4.0 "," 5.0 ","-3.0 ","-2.0 ","-1.0 "
360 DATA " 0.0 "," 1.0 "," 2.0 "," 3.0 ","-2.5 ","-2.0 ","-1.5 ","-1.0 "
370 DATA "-0.5 "," 0.0 "," 0.5 "," 1.0 "," 1.5 "," 2.0 "," 2.5 ","-1.5 "
380 DATA "-1.0 ","-0.5 "," 0.0 "," 0.5 "," 1.0 "," 1.5 ","-1.2 ","-1.0 "
390 DATA "-0.8 ","-0.6 ","-0.4 ","-0.2 "," 0.0 "," 0.2 "," 0.4 "," 0.6 "
400 DATA " 0.8 "," 1.0 "," 1.2 "
```

```
405 REM **** SET UP SCALE NUMBERING MATRIX ****
410 FOR J=1 TO 11:READ S$(1,J):NEXT:FOR J=1 TO 7:READ S$(2,J):NEXT
420 FOR J=1 TO 11:READ S$(3,J):NEXT:FOR J=1 TO 7:READ S$(4,J):NEXT
430 FOR J=1 TO 11:READ S$(5,J):NEXT:FOR J=1 TO 7:READ S$(6,J):NEXT
440 FOR J=1 TO 13:READ S$(7,J):NEXT
450 P1$="     ":P2$="     ":P3$="       ":O$(1)="MULTIPLY"
460 O$(2)="DIVIDE":E$(0)=" UNITY":E$(1)=" 10":E$(2)=" 100":E$(3)=" 1,000"
470 E$(4)=" 10,000":E$(5)=" 100,000":E$(6)=" 1 MILLION":E$(7)=" 10 MILLION"
480 E$(8)=" 100 MILLION":E$(9)=" 1,000 MILLION":PP$="PLOTTED POINT":U$="UNITS"
490 IF Z>1 THEN PP$=PP$+"S"
495 REM **** ASSEMBLE SCALE GRADUATIONS ****
500 OPEN5,4,5:PRINT#5,CHR$(15)+CHR$(8)+CHR$(8)+CHR$(8)+CHR$(8)+CHR$(8):CLOSE5
510 A$=CHR$(254):B$="   ├":FOR J=1 TO 24:B$=B$+"-"+A$+"┼":NEXT:S1$=B$+"-"+A$+"┤"
520 B$="   ├":FOR J=1 TO 36:B$=B$+"─┼":NEXT:S2$=B$+"─┤"
530 YL=0:YU=0:XZ=-1
535 REM **** COMPUTE 'Y' VALUES AND FIND UPPER AND LOWER LIMITS ****
540 FOR J=0 TO N:X=XL+J*XI:GOSUB 150
545 IF X>-1E-9 AND X<1E-9 THEN XZ=J
550 FOR Q=N0 TO NY:YY(Q,J)=Y(Q):IF Y(Q)>YU THEN YU=Y(Q)
560 IF Y(Q)<YL THEN YL=Y(Q)
565 REM **** FIND RANGE IN Y AND DECADE SCALE FACTOR ****
570 NEXT:NEXT:RA=YU-YL:YL=YL*(1+1E-8)
580 RM=ABS(RA):DF=1:RE=0:RS=1:IF INT(RA)=0 THEN RS=2
590 IF RM>=.96 AND RM<9.6 THEN 620
600 RE=RE+1:IF RM>=9.6 THEN RM=RM/10:DF=DF*10:GOTO 590
610 RM=RM*10:DF=DF/10:GOTO 590
615 REM **** PRINT SCALE FACTORS ****
620 IF XI*Z=1 THEN U$="UNIT"
625 OPEN1,4:PRINT#1,P1$+"ABSCISSA SCALE - ONE DIVISION ="XI*Z;U$
630 PRINT#1,P1$+P2$+"- ONE DIVISION ="Z;PP$:PRINT#1
635 PRINT#1,P1$+O$(RS)+" ORDINATE SCALE BY"E$(RE):PRINT#1:PRINT#1:CLOSE1
640 REM **** SELECT SCALE AND CONSTANTS ****
645 IF RM>7 THEN F=1:G=15/2:S=1
650 IF RM=<7 AND RM>4.8 THEN F=2:G=10:S=1
660 IF RM=<4.8 AND RM>3.5 THEN F=3:G=15:S=2
670 IF RM=<3.5 AND RM>2.4 THEN F=4:G=20:S=2
680 IF RM=<2.4 AND RM>1.75 THEN F=5:G=30:S=4
690 IF RM=<1.75 AND RM>1.2 THEN F=6:G=40:S=4
700 IF RM=<1.2 THEN F=7:G=60:S=8
705 REM **** ASSEMBLE SCALE NUMBERING ****
710 A=ABS(YL*S/DF):B=1/2:C=5/2:D=5:E=0:J1=6:J2=10:F$="    ":P$=P1$:SC$=S1$:M=3
720 IF F/2=INT(F/2) THEN C=5:D=10:E=7:J1=4:J2=6:F$="  ":P$=P2$:SC$=S2$:M=2
730 IF F=7 THEN B=5/8:C=5/2:D=4:E=1:J1=7:J2=12:P$=P3$
740 H=INT(A*B):K=H:AS=INT(A*C):IF AS<A*C THEN AS=AS+1
750 L=AS-D*H:IF L>E THEN K=K+1
760 SA$="":FOR J=J1-H TO J2-K:SA$=SA$+S$(F,J)+P$:NEXT:SA$=SA$+S$(F,J)
770 IF L=0 THEN 790
780 SB$="":FOR J=1 TO L:SB$=SB$+F$:NEXT:SA$=SB$+SA$
785 REM **** PRINT NUMBERED SCALE AND FIRST VALUE OF X ****
790 OPEN1,4:PRINT#1,SA$:PRINT#1,SC$:PRINT#1
800 CH=M*AS+1:M$="":FOR J=1 TO CH:M$=M$+" ":NEXT
805 REM **** SET PAPER FEED ****
810 PRINT#1,M$XL:PRINT#1:OPEN6,4,6:PRINT#6,CHR$(IL/PI):CLOSE6
815 REM **** PROGRAMMED CHARACTER DATA ****
820 X0$=CHR$(0):X8$=CHR$(8):X2$=CHR$(20):X3$=CHR$(28):XX$=X0$+X0$+X0$+X0$+X0$
830 A$(0)=X0$:A$(1)=X0$:A$(2)=X8$:A$(3)=X2$:A$(4)=X2$:A$(5)=X8$
840 B$(0)=X8$:B$(1)=X8$:B$(2)=X3$:B$(3)=X8$:B$(4)=X8$:B$(5)=X8$
850 C$(0)=X0$:C$(1)=X0$:C$(2)=X8$:C$(3)=X2$:C$(4)=X8$:C$(5)=X2$
855 REM **** SET UP PROG CHAR DATA MATRIX ****
860 FOR J=0 TO 5:FOR Q=N0 TO NY:I$(Q,J)="":NEXT
870 FOR T=0 TO 5:FOR Q=N0 TO NY:J$(Q,T)=X0$
```

```
 880 IF T=J-1 THEN J$(Q,T)=A$(Q)
 890 IF T=J THEN J$(Q,T)=B$(Q)
 900 IF T=J+1 THEN J$(Q,T)=C$(Q)
 910 I$(Q,J)=I$(Q,J)+J$(Q,T):NEXT:NEXT:NEXT
 915 REM **** PLOT POINTS ****
 920 OPEN5,4,5:FOR J=0 TO N
 930 AX$="":FOR Q=1 TO AS*M+2:AX$=AX$+" ":NEXT:AX$=AX$+"+"
 935 REM **** PRINT X AXIS GRADUATIONS ****
 940 IF XZ=J THEN PRINT#1,AX$+"0"CHR$(141);:GOTO 1000
 950 IF Z=1 THEN PRINT#1,AX$CHR$(141);
 960 IF Z=2 AND J/2=INT(J/2) THEN PRINT#1,AX$CHR$(141);
 970 IF Z=3 AND J/3=INT(J/3) THEN PRINT#1,AX$CHR$(141);
 980 IF Z=6 AND J/6=INT(J/6) THEN PRINT#1,AX$CHR$(141);
 995 REM **** COMPUTE CHAR POSITION AND POINT POSITION WITHIN CHAR ****
 1000 FOR Q=N0 TO NY
 1010 Y=YY(Q,J)*G/DF:IY=INT(Y):CH=AS*M+IY+2:IC=INT((Y-IY)*6+.5)+3
 1020 IF IC>=6 THEN CH=CH+1:IC=IC-6
 1030 CH$="":FOR T=1 TO CH-1:CH$=CH$+" ":NEXT
 1040 IF Q<2 THEN 1070
 1050 IF IC=0 THEN PRINT#5,XX$+A$(Q):PRINT#1,CH$+CHR$(254)CHR$(141);
 1060 IF IC=5 THEN PRINT#5,C$(Q)+XX$:PRINT#1,CH$+"  "+CHR$(254)CHR$(141);
 1070 PRINT#5,I$(Q,IC):PRINT#1,CH$+" "+CHR$(254)CHR$(141);
 1080 NEXT:PRINT#1:NEXT
 1085 REM **** RESET PAPER FEED ****
 1090 CLOSE5:OPEN6,4,6:PRINT#6,CHR$(IL/6):CLOSE6
 1095 REM **** PRINT LAST VALUE OF X ****
 1100 PRINT#1:PRINT#1,M$XU:PRINT#1:PRINT#1
 1110 IF NY<2 THEN 1160
 1115 REM **** PRINT PLOT CHARACTER DESIGNATIONS ****
 1120 OPEN5,4,5:S$="":SP$="     "
 1125 Y$(1)="Y(1)":Y$(2)="Y(2)":Y$(3)="Y(3)":Y$(4)="Y(4)":Y$(5)="Y(5)"
 1130 FOR J=N0 TO NY:S$=S$+SP$
 1140 PRINT#5,I$(J,2):PRINT#1,S$+Y$(J)+" = "CHR$(254)CHR$(141);:NEXT
 1150 PRINT#1:PRINT#1
 1160 PRINT#1:PRINT#1:PRINT#1:CLOSE1:CLOSE5
 1200 INPUT"█1█ TO PRINT PLOTTED VALUES, OR █2█ TO PLOT NEW FUNCTION(S)  2███";A
A
 1210 PRINT:IF AA<>1 AND AA<>2 THEN 1200
 1220 IF AA=2 THEN 90
 1230 FA$="        A           AAAA        AAAA       AAAA       AAAA       AAAA"
 1240 FB$="     S9999.9999     S9.9999     S9.9999    S9.9999    S9.9999    S9.9999"
 1250 FOR J=1 TO 5:A$(J)="":NEXT:XX$="X":R$=CHR$(29):OPEN1,4,1:OPEN2,4,2
 1260 IF N0=0 THEN A$(1)="Y(0)":A$(2)="Y(1)":GOTO 1280
 1270 FOR J=N0 TO NY:A$(J)=Y$(J):NEXT
 1280 PRINT#2,FA$:PRINT#1,XX$R$A$(1)R$A$(2)R$A$(3)R$A$(4)R$A$(5)
 1290 PRINT#1:PRINT#2,FB$:CLOSE2:FOR J=1 TO 5:Y(J)=0:NEXT:BB=0
 1300 FOR J=0 TO N:X=XL+J*XI
 1310 IF N0=0 THEN Y(1)=YY(0,J)/DF:Y(2)=YY(1,J)/DF:GOTO 1330
 1320 FOR T=N0 TO NY:Y(T)=YY(T,J)/DF:NEXT
 1330 PRINT#1,X,Y(1),Y(2),Y(3),Y(4),Y(5)
 1340 BB=BB+1:IF BB=4 THEN BB=0:PRINT#1
 1350 NEXT:PRINT#1:CLOSE1
 1360 OPEN 1,4:PRINT#1,P1$+O$(RS)+" 'Y' VALUES BY"E$(RE):PRINT#1:PRINT#1:PRINT#1
 1370 CLOSE1
READY.
```

VIC

This month we have five programs for the VIC-20. Four of them are for the unexpanded machine, and the fifth requires 3K of expansion. But first, a small utility program for the 64.

Machine Code to Data

The listing below is for turning your machine code into decimal data statements. The program starts at line 60000 so that you may start the data anywhere below that number. Owners of the 40 column PRTs need only change line 61000 to:

61000 POKE 158,2: POKE 623,13: POKE 624,13

for the program to work on their machine.

```
60000 PRINT"┐▧CREATE DECIMAL DATA STMNTS FROM MCHCODE"
60005 PRINT"▧    *** CBM MODEL ▧-64-▀  ***"
60010 INPUT"▧▧▧▧▧START LINE #    ▮▩▩";S$:IFS$=" "THEN60010
60020 INPUT"▧▧▧▧▧▧▧STEP   ▮▩▩";T$:IFT$=" "THEN60020
60030 INPUT"▧▧▧▧▧▧▧▧▧START ADDRESS DECIMAL   ▮▩▩";B$:IFB$=" "THEN60030
60040 INPUT"▧▧▧▧▧▧▧▧▧▧▧END ADDRESS DECIMAL    ▮▩▩";E$:IFE$=" "THEN60040
60050 S=VAL(S$):T=VAL(T$):B=VAL(B$):E=VAL(E$):F=B:L=F+6:PRINT"▧▧▧▧"
60060 POKE831,INT(E/256)
60070 POKE832,E-INT(E/256)*256
60080 POKE828,T:GOTO60500
60090 T=PEEK(828)
60100 S=PEEK(826)*256+PEEK(827)
60110 L=PEEK(829)*256+PEEK(830)
60120 E=PEEK(831)*256+PEEK(832)
60130 IF L>=E THEN 62000
60140 F=L+1:L=L+7
60150 PRINT"┐                                  "
60500 PRINTS;
60600 PRINT"DATA";
60700 FORP=FTOL:PRINTMID$(STR$(PEEK(P)),2);",";:NEXTP
60800 PRINT"▮ "
60900 PRINT"GOTO60090┬┬┐";
61000 POKE 198,2:POKE631,13:POKE 632,13
61100 S=S+T
61200 POKE 826,INT(S/256)
61300 POKE 827,S-INT(S/256)*256
61400 POKE 829,INT(L/256)
61500 POKE 830,L-INT(L/256)*256:END
62000 END
READY.
```

UFO TARGET

VIC

Shoot the ufo's down with the rockets on your base to gain points. Instructions are in the listing.

```
13 GOTO65
14 VR=PEEK(648)*256:POKE36869,240
15 KR=38400:IFVR<>7680THENKR=37888
16 VI=9*16↑3:OF=KR-VR:PRINT"┐
17 FORA=KR+22TOKR+22*23:POKEA,0:NEXT
18 C=VR+22*20+14
19 POKEVI+15,6+128+64+32+8:M=M+1
20 POKE36879,110:PRINT"┐┬***** UFO TARGET *****
21 POKE36869,255:SE=SE+1:PRINT"▧▧▧▧▧▧▧▧▧▧▧▧▧▧▧=▧▮▧▧▮▧▧▮▧▧▮▧▧▮▧▧▮▧▧▧▧▧▧▧▧▧▧▧▧▧▧▧▧▧
```

```
";SE;"";
 22 PRINT"QQQQQQQQQQQQQQQQQQQQQQ]↑↑↑↑↑↑↑↑↑↑↑↑↑↑S
 23 PRINT"SQQR     SCORE ="SC
 24 A=VR+22*22+15
 25 IFC<>8121THENGETA$:IFA$<>""ANDB=0THENB=1:POKEC+22,32:D=C:C=C-1:K=1:POKE9*16↑
3+13,128+125:L=16
 26 IFA$="Q"THENPOKE56,PEEK(56)+2:PRINT"♥■":POKE36869,240:POKE36879,27:END
 27 IFK=1THENL=L-1:POKE9*16↑3+14,L
 28 IFL=0THENK=0:POKE9*16↑3+13,0
 29 IFC=8121ANDB=0THENGOTO18
 30 IFB=0THEN35
 31 POKED,32:D=D-22
 32 IFPEEK(D)=60ORPEEK(D)=62THENGOSUB47:GOTO25
 33 IFD<VR+88THENB=0:GOTO35
 34 POKED+OF,1:POKED,30
 35 IFH=0THEN44
 36 IFH=0THEN25
 37 POKEF,32:F=F+E:POKEF,32
 38 IFF=ITHENH=0:GOTO25
 39 IFPEEK(F)=30THENGOSUB47:GOTO25
 40 POKEF+OF,1:POKEF+OF+E,1
 41 IFE=1THENPOKEF,60:POKEF+E,62:GOTO25
 42 IFE=-1THENPOKEF,62:POKEF+E,60:GOTO25
 43 GOTO25
 44 H=1
 45 IFINT(RND(1)*2)=1THENE=-1:F=VR+21+(INT(RND(1)*10)+6)*22:I=F-21:G=60:GOTO36
 46 E=1:F=VR+1+(INT(RND(1)*10)+6)*22:I=F+20:G=62:GOTO36
 47 B=0:H=0
 48 SC=SC+1:PRINT"SQQR     SCORE ="SC
 49 Q=INT(100*SC/M):Q=Q/100:Q$=STR$(Q):Q$=RIGHT$(Q$,LEN(Q$)-1)
 50 IFQ=INT(Q)THENQ$=Q$+".00":GOTO52
 51 IF10*Q=INT(10*Q)THENQ$=Q$+"0":GOTO52
 52 PRINT"  AVERAGE = "Q$
 53 POKEF+OF,1:POKEF+OF+1,2:POKEF+OF-1,2
 54 POKEF+OF+22,2:POKEF+OF-22,2
 55 POKEF,42:POKEF+1,31:POKEF-1,31:POKEF+22,31:POKEF-22,31
 56 POKE9*16↑3+13,128+35
 57 FORY=1TO20
 58 POKE9*16↑3+14,15-INT(Y/1.33)
 59 FORP=1TO80:NEXT:NEXT
 60 POKEF,32:POKEF+1,32:POKEF-1,32:POKEF+22,32:POKEF-22,32
 61 POKEF+OF,0:POKEF+OF+1,0:POKEF+OF-1,0
 62 POKEF+OF+22,0:POKEF+OF-22,0
 63 POKE9*16↑3+13,0
 64 RETURN
 65 POKE36879,110:POKE36869,240:PRINT"♥R   ***UFO TARGET***"
 66 PRINT"QQFIRE AT THE UFO'S
 67 PRINT"BY USING THE SPACE
 68 PRINT"BAR.
 69 PRINT"QQQ = STOP
 70 PRINT"QQHIT A KEY TO START.":GOTO73
 71 GETA$:IFA$=""THEN71
 72 GOTO14
 73 T=PEEK(52)*256+PEEK(51):T=PEEK(T):IFT=255THEN79
 74 X=PEEK(56)-2:POKE52,X:POKE56,X:POKE51,PEEK(55):CLR
 75 CS=256*PEEK(52)+PEEK(51)
 76 FORI=CSTOCS+511:POKEI,PEEK(I+32768-CS):NEXT
 77 FORK=1TO5
 78 READX:FORI=0TO7:READA:POKEX+I,A:NEXT:NEXT
 79 POKE36869,255:GOTO71
 80 DATA7408,24,60,60,60,60,60,60,126
 81 DATA7664,0,240,254,255,255,254,240,0
 82 DATA7648,0,15,127,255,255,127,15,0
 83 DATA7168,255,191,223,239,247,251,253,255
 84 DATA7416,255,255,255,255,255,255,255,255
READY.
```

BASIC PROGRAMMING

VIC

LAWNMOWER

See how long it takes you to mow the VIC's lawn, but beware of weeds and rocks as they slow up the process. Instructions for moving are in the program.

```
100 REM****LAWNMOWER****
110 REM
120 REM
125 REM
130 POKE36879,8:GOSUB840:POKE36879,25
140 VR=PEEK(648)*256
150 KR=38400:IFVR<>7680THENKR=37888
160 OF=KR-VR
170 KL=0
180 WD=22
190 HA=36878
200 S=36876
210 G=9
220 FORI=1TO9:READK$(I):NEXT
230 DATAZ,X,C,A,S,D,Q,W,E
240 M(1)=WD-1:M(2)=WD:M(3)=WD+1:M(4)=-1:M(5)=0:M(6)=1:M(7)=-WD-1:M(8)=-WD
250 M(9)=-WD+1
260 AA$="██████████████|"
270 X=VR+460:A=5:POKEHA,15:POKES,0
280 T1=TI
290 PRINT"▯█PERCENT:
300 PRINT"█┌──────▪█▄▄▄▄█ ▄ ▪┌───────┐";
310 PRINT"█|█▒▒▒▒▒▒▒▒█|██   ██ || |█▒▒█↑↑█▒▒█|";
320 PRINT"█|█▒▒▒▒▒▒▒▒█|██   ██ || |█▒▒█↑↑↑██|";
330 PRINT"█|█▒▒▒▒▒▒▒▒█|██   ██ || |█▒▒▒█↑↑██|";
340 PRINT"█|█▒▒▒▒▒█↑█|██   ██ || |█▒▒▒▒▒▒▒█|";
350 PRINT"█|█▒▒▒▒█↑↑██ ██   ███ ██| ╰──╮█▒▒▒█|";
360 PRINT"█|█▒▒▒▒▒█↑↑█ |  ██    |█▒▒▒█|";
370 PRINT"█|█▒▒▒▒▒█↑██ |  ▙▄●█▄▟●█ |█▒▒▒█|";
380 PRINT"█|█▒▒▒▒▒█↑█  |  ▙▄●█▟▄▙▄●█ |█▒▒▒█|";
390 PRINT"█|█▒▒▒▒▒▒██  | /     ██|█▒▒▒█|";
400 PRINT"█|█▒▒▒▒▒▒██  |/      ██|█▒▒▒█|";
410 PRINT"█|█▒▒▒▒▒▒██  |/______██|█▒▒▒█|";
420 PRINT"█|█▒▒▒▒▒▒██  |\      ██|█▒▒▒█|";
430 PRINT"█|█▒▒▒▒▒▒██  | \     ██|█▒▒▒█|";
440 PRINT"█|█▒▒▒▒▒↑██  |  \   _██|█▒▒▒█|";
450 PRINT"█|█▒▒▒▒▒↑↑▒▒▒█▘▘▘▘█▄▄▄▄█▒█|";
460 PRINT"█|█▒▒▒▒▒▒▒▒▒▒▒▒█▘▘██   ██▒█|";
470 PRINT"█|█▒▒▒▒▒▒▒▒▒▒▒▒█▘▘██   ██▒█|";
480 PRINT"█|█▒▒▒▒▒▒▒▒▒▒▒▒█▘▘██▄▄▄▟█▒█|";
490 PRINT"█|█▒▒▒▒▒▒▒▒▒▒▒▒█▘▘█▒▒▒▒▒▒█|";
500 PRINT"█|█▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒█|";
510 PRINT"█└────────────────────┘████─██
520 Y=86
530 Z=PEEK(X+W):IFZ=32GOTO560
540 IFZ<>102THENA=5:GOTO570
550 POKES,255:P=P+1:IFRND(1)<.02THEN710
560 POKEX,32:POKEX+OF,KL:X=X+W
570 POKEX,Y:POKEX+OF,KL:B=A:W=0:GOSUB790:IFA=0THENA=B
580 IFY=86THENY=91:GOTO600
590 Y=86
600 PRINT"█"TAB(8)INT(P/212*100)
610 POKES,100:POKES,0:IFP=213THEN630
620 W=M(A):GOTO530
```

```
 630 POKEX,215:POKEX+OF,KL:FORX=1TO250STEP.5:POKES,X:NEXT:POKES,0
 640 PRINT"⊐COMPLETED IN
 650 T0=TI-T1:T0=INT(T0/60)
 660 PRINT"▒"T0"SECONDS.
 670 PRINT"▒▒ANOTHER GO?
 680 GETA$:IFA$=""THEN680
 690 IFA$="Y"THENRUN
 700 POKEHA,0:PRINT"⊐▒";:POKE36879,27:END
 710 POKEX,32:POKEX+OF,KL:X=X+W:BB$="▒STONE▒":IFRND(1)<.5THENBB$="▒WEEDS▒"
 720 POKEHA,15
 730 FORC=1TO10:POKES,50:PRINTAA$BB$:POKEX,214:POKEX+OF,KL:FORKK=1TO150:NEXT
 740 POKES,200:PRINTAA$"      "
 750 POKEX,32:POKEX+OF,KL:FORKK=1TO100:NEXT:NEXT:A=5:GOTO570
 760 FORX=250TO1STEP-4
 770 POKES,X:NEXT:FORX=150TO100STEP-1:POKES,X:NEXT:PRINTAA$"      "
 780 FORX=1TO100:NEXT:RETURN
 790 GETA$:A=0:FORII=1TO9
 800 IFA$=K$(II)THENA=II:II=9
 810 NEXT
 820 RETURN
 840 PRINT"⊐≢*** VIC LAWNMOWER ***
 850 PRINT"▒HI, DONT YOU FIND
 860 PRINT"THAT YOUR LAWN
 870 PRINT"NEEDS A CUT ?
 880 PRINT"WELL GO AHEAD!
 890 PRINT"▒YOU MOVE WITH :
 895 PRINT"────────────────
 900 PRINT" Q  W  E
 905 PRINT"    |
 910 PRINT"   \|/
 920 PRINT" A──S──D
 930 PRINT"   /|\
 940 PRINT"    |
 950 PRINT" Z  X  C
 960 PRINT"▒▒S STOPS MOVEMENT
 970 PRINT"▒IN ANY DIRECTION.
 980 PRINT"▒HIT ANY KEY TO START.
 1000 GETA$:IFA$=""THEN1000
 1010 PRINT"⊐":RETURN

READY.
```

BARRICADE

Instructions included within the program.

```
 100
 110
 130 VR=7680
 140 KR=38400
 150 A3=506
 160 POKE36879,42
 170 PRINT"▓▓***** BARRICADE *****
 180 PRINT"▓▓YOU GET 5 BALLS.
 190 PRINT"▓TRY TO TRAP EACH BALL
 200 PRINT"▓WITH AS FEW AS
 210 PRINT"▓POSSIBLE BARRICADES.
 230 PRINT"▓▓▓WITH THE SPACE BAR
 240 PRINT"▓YOU CREATE A BARRICADE
 250 PRINT"BEHIND THE BALL.
 260 PRINT"▓▓▓START WITH A SPACE.
 270 GETA$:IFA$=""THEN270
 280 A2=0:E=102:F=81:G=32:I=1:H=22:J=20
 290 POKE36879,218
 300 PRINT"▓▓▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒";
 310 FORII=1TO21:PRINT"▒                                         ▒";:NEXT
 320 PRINT"▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▓▓▓▓▓▓▓ ▓
 330 FORSS=1TO10:GETA$:NEXT:N=VR+97:C=0
 340 P=I:GOSUB430:P=H:GOSUB430
 350 P=-I:GOSUB430:P=-H:GOSUB430
 360 IFX=NGOTO380
 370 X=N:GOTO340
 380 P=-I:GOSUB430:P=H:GOSUB430
 390 P=I:GOSUB430:P=-H:GOSUB430
 400 IFY>JGOTO490
 410 IFX=NGOTO340
 420 X=N:GOTO380
 430 N=N+P:A=PEEK(N)
 440 FORU=1TO25:NEXT
 450 IFA=ETHENN=N-P:Y=Y+I:RETURN
 460 POKE(N),F:POKEKR+(N-VR),2:POKE(N-P),G:Y=I:GETB$
 470 IFB$<>""THENPOKE(N-P),E:POKEKR+(N-VR)-P,6:C=C+I
 480 GOTO430
 490 N=VR+INT((RND(1))*505):N1=PEEK(N)
 500 IFN1=EGOTO490
 510 IFN1=81GOTO490
 520 A2=A2+1:IFA2<5THENFORP=0TO9:GETY$:NEXTP:GOTO340
 530 IFA3>CTHENA3=C
 540 POKE36879,42:PRINT"▓▓**** BARRICADE ****":PRINT"▓BEST SCORE IS";A3
 550 PRINT"▓YOUR SCORE IS";C
 560 PRINT"▓ANOTHER GO?(Y/N)
 570 FORI=1TO100:NEXT
 580 GET A$:IFA$<>"Y"ANDA$<>"N"THENGOTO580
 590 IFA$="Y"THEN160
 600 POKE36879,27:PRINT"▓▓";
READY.
```

BASIC PROGRAMMING

VIC

BIORHYTHMS

Check up on your biorhythmic cycles with this program. You may compare your biorhythms with those of a friend, to see how compatible you are with them.

```
 100 DIMA(12),X(3),J(3),CD(3,2),R(3),S(3):FORI=1TO12:READA(I):NEXT:DEFFNY(I)=28-
(I/4=INT(I/4))
 102 P(1)=16:P(2)=5:P(3)=9:M$="JANFEBMARAPRMAYJUNJULAUGSEPOCTNOVDEC":W$="MTWTFSS
"
 108 S(1)=36874:S(2)=36875:SP$="                    ":F$="▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒
Q"
 110 DEFFNS(I)=8*SIN((T/I-INT(T/I))*2*π):DEFFNP(I)=8119-INT(I+11.5)*22+INT((Q+1)
/2)
 150 S(3)=36876:POKE36879,27:PRINTCHR$(142)"▒▒▒▒▒▒▒▒█"
 151 PRINTTAB(6)"BIORHYTHM"
 156 PRINT"▒";:GOSUB9070:PRINTF$;:GOSUB9070
 157 PRINTF$"▒▒█INSTRUCTIONS (Y/N)";:GOSUB9060:PRINTCHR$(14):IFI$="N"THEN200
 160 PRINT"▒▒▒GIVE DATE AS":PRINT"                ▒▒MONTH/DAY/YEAR"
 175 PRINT"▒▒▒(8/13/57▒=AUG 13,1957)"
 182 GOSUB9050:PRINT"▒▒▒AFTER GRAPH IS DRAWN  PRESS FOR:"
 185 PRINT"▒▒▒F1▒  START AGAIN":PRINT"▒▒F7▒  NEXT 20 DAYS
 186 PRINT"▒▒K▒   CRITICAL DAYS":PRINT"▒▒S▒   STOP":PRINT"▒▒C▒   COMPARE":GOSUB9
050
 200 POKE36879,27:PRINT"▒▒▒DRAW FROM ":PRINT"(M/D/Y)   ▒";:GOSUB1000:IFI1=0THEN2
00
 210 M1=I1:D1=I2:Y1=I3:D0=D1:FORI=1TOM1-1:D0=D0+A(I):NEXT
 215 D3=Y1*365+D0:FORI=1TOY1-1:D3=D3-(I/4=INT(I/4)):NEXT
 220 I$="":PRINT"▒▒▒▒▒▒▒BIRTH DATE";:GOSUB1000:IFI1=0THEN220
 225 M=I1:FORI=1TOM-1:I2=I2+A(I):NEXT:GOSUB800:D=I2:Y=I3
 270 PRINT"▒COMPARE (Y/N)":GOSUB9060:R=0:T3=0:IFI$="N"THEN300
 280 R=1:PRINT"▒▒▒▒▒▒▒▒▒▒BIRTH DATE 2";:GOSUB1000:IFI1=0THEN280
 290 FORI=1TOI1-1:I2=I2+A(I):NEXT:T3=T:GOSUB800:GOSUB820
 300 IFT<0ORT3<0THENPRINT"▒BEGINS FROM BIRTH DATE":GOSUB9050:GOTO200
 400 PRINT"▒▒▒ON "MID$(M$,3*M1-2,3)D1","Y1+1900:PRINT"▒YOU HAVE LIVED":PRINT"▒▒
"T"DAYS"
 500 GOSUB9050:POKE36879,25:PRINT"▒█"LEFT$(F$,9):FORI=1TO20:PRINT"-";:NEXTI
 505 PRINTLEFT$(F$,19)"▒"SP$:T2=M1
 510 PRINTLEFT$(F$,19)"▒"MID$(M$,3*M1-2,3)Y1+1900"▒";:PRINTLEFT$(F$,20);
 600 FORI=1TO3:J(I)=0:R(I)=0:FORJ=0TO2:CD(I,J)=0:NEXTJ,I:FORQ=1TO40:IFQ/2=INT(Q/
2)THEN618
 610 E=D3-1:E=INT(7*(E/7-INT(E/7))+.5)+1:E$=MID$(STR$(D1),2)
 615 PRINT"▒▒"MID$(W$,E,1)"▒▒▒"LEFT$(E$,1)"▒";:IFLEN(E$)>1THENPRINT"▒"RIGHT$(E$,
1);
 617 PRINT"▒▒";
 618 POKE36878,9:FORI=1TO3:X=FNS(18+I*5):GOSUB820:R(I)=R(I)-(SGN(X)=SGN(FNS(18+I
*5)))*2.5:GOSUB820
 619 IFX<.6ANDX>-.6THENCD(I,J(I))=M1*100+D1:J(I)=J(I)+1
 620 Z=PEEK(FNP(X)):IFZ=32ORZ=45ORZ=P(I)THENPOKEFNP(X),P(I):POKEFNP(X)+30720,I+4
:GOTO630
 625 POKEFNP(X),42
 630 POKES(I),2*X+200:FORJ=0TO20:NEXT:POKES(I),0:NEXTI:D3=D3+.5:T=T+.5:T3=T3+.5:
D1=D1+.5
 640 IFD1>=A(M1)+1THEND1=1:M1=M1+1:IFM1>12THENM1=1:Y1=Y1+1
 645 NEXTQ:POKE198,0
 650 IFT2<>M1ANDD1<>1THENPRINTLEFT$(F$,19)"▒▒▒▒▒▒▒▒▒▒▒▒▒▒"MID$(M$,3*M1-2,3)Y1+190
0"▒"
 655 PRINTF$"▒HIT F1,F7,K,S";:IFR=1THENPRINT",C";
 730 GOSUB9060:I=ASC(I$):IFI=133THEN200
 735 IFI=83THENPRINT"▒▒":POKE36879,27:END
 745 IFI<>67ORR=0THEN750
 746 PRINT"▒▒OVERLAP":PRINT"▒PHYS:"R(1)"%":PRINT"EMOT:"R(2)"%":PRINT"INT :"R(3)"
%"
```

```
 747 GOTO655
 750 IFI=136THEN400
 780 IFI<>75THEN655
 785 PRINT"■■■CRITICAL DAYS":PRINT"■■■PHYS.■■■EMOT.■■■INT."
 790 FORI=1TO3:FORJ=0TO2:IFCD(I,J)=0THEN794
 791 K2=INT(CD(I,J)/100):K1=CD(I,J)-K2*100:K2=K2-1
 792 PRINTLEFT$(F$,6+2*J)TAB((I-1)*7)MID$(B$,K2*3+1,3)STR$(INT(K1))
 794 NEXTJ,I:GOTO655
 800 T=0:IFY1=I3THEN810
 805 FORI=I3+1TOY1-1:T=T-(I/4=INT(I/4)):NEXT:T=T-(I3/4=INT(I3/4)ANDI2>58)
 810 T=T+(Y1-I3-1-(D0>=I2))*365-(D0>=I2)*(D0-I2)-(D0<I2)*(365-I2+D0):RETURN
 820 K2=T:T=T3:T3=K2:RETURN
 1000 I=4:INPUTI$:I1=VAL(LEFT$(I$,2)):IFMID$(I$,2,1)>"9"ORMID$(I$,2,1)<"0"THENI=
3
 1005 I2=VAL(MID$(I$,I,2)):I3=VAL(RIGHT$(I$,2)):A(2)=FNY(I3):IFI1>12ORI1<1THEN10
30
 1020 IFI2>0ANDI2<=A(I1)THENRETURN
 1030 PRINT"■WRONG DATE":FORI=0TO1800:NEXT:PRINT"■":I1=0:RETURN
 9050 PRINTF$"■■ HIT A KEY
 9060 GETI$:IFI$=""THEN9060
 9065 RETURN
 9070 FORI=1TO21:PRINTMID$("■■■■■■■",I+(I>8)*8+(I>16)*8,1)"■ ";:NEXT:PRINT"■■■
";
 9080 RETURN
 9100 DATA31,28,31,30,31,30,31,31,30,31,30,31
READY.
```

RACE CAR

A very good version of an arcade game. Instructions are again, included in the program. This game requires 3K of expansion.

```
5 PRINT"■":POKE45,212:POKE46,25:POKE47,212:POKE48,25:POKE49,212:POKE50,25:POKE51
,0:POKE52,28
6 POKE55,0:POKE56,28:POKE36869,255:DIMOL(2),D(2),C(2),CL(2),A(3):V=36878:S1=V-4
8 GOSUB1225
10 IFH>X%THENX%=H
11 POKEV+1,27:PRINT"■■■SCORE■:"H"■REC■:"X%:H=0
12 POKE36869,240
15 PRINTTAB(5)"■■■■RACE CAR":PRINTTAB(2)"■************"
16 PRINT"■■■■":PRINT"■J TO MOVE INWARDS
17 PRINT"K TO MOVE OUTWARDS":PRINT"A TO ACCELERATE":PRINT"D TO SLOW DOWN
18 PRINT"■■■■HIT ANY KEY TO START":PRINT"■■HIT N IF YOU DO NOT    WANT ANOTHER GO
.
19 GETA$:IFA$=""THEN19
20 IFA$="N"THENGOTO1290
21 POKE36869,255
100 B$="←←←←←←←←":C$="#$%&":L$="■■■■■■■■■■■":D$="■■↑T■■↑■":S3=V-1
110 CV=30720:DO=46:AS=42:O=1:T=22:MO=-1:MT=-22:A(1)=75:A(3)=74:C=3:R=1:Z7=10:Z1=
72:Y=3
120 PRINT"■";:POKEV+1,40:POKEV,0:A$="↑■↑■↑■↑■":P=1:FORI=12TO4STEP-2:GOSUB1000:NE
XT:G=0
130 FORK=1TO2:PRINT"↑"SPC(7)"↑■■■↑"SPC(7)"↑";:NEXTK:PRINT"↑■■■■↑■■■";
140 PRINT:P=3:FORI=4TO12STEP2:GOSUB1000:NEXT
142 W=7703:FORI=7TO1STEP-2:FORJ=WTOW+ISTEP2:POKEJ,46:POKEJ+I+6,46:NEXT:W=W+46:NE
XTI
144 W=7703:FORI=8TO2STEP-2:FORJ=WTOW+I*22STEP44:POKEJ,46:POKEJ+2*I+3,46:NEXT:W=W
+46:NEXTI
146 W=8121:FORI=8TO2STEP-2:FORJ=WTOW-I*22+22STEP-44:POKEJ,46:POKEJ+2*I+3,46:NEXT
:W=W-42:NEXTI
148 W=8121:FORI=7TO1STEP-2:FORJ=WTOW+ISTEP2:POKEJ,46:POKEJ+I+6,46:NEXT:W=W-42:NE
XTI:W=2:P=32:GOSUB1100
150 C(O)=40:C(W)=41:L(O)=7964:L(W)=8130:CL(O)=3:CL(W)=1:Z=202:FORK=1TO2:POKEL(K)
```

```
+CV,CL(K)
151 POKEL(K),C(K):Q(K)=0:OL(K)=P:NEXT:F=O-(R>W)*W:D(O)=MT:D(W)=MO:S=0:M=-(R>W):I
FC<1THEN10
152 POKEV,Z7:FORK=MTOF:J=(INT(K/W)=K/W)+2:POKES1,Z:L=L(J):D=D(J):IFJ=0THEN160
155 Q=SGN(Q(O)-Q(W))+W:A=A(Q):ONQGOTO190,200,190
160 GETA$:A$=A$+" ":A=ASC(A$):IFA=65THENF=W-(R>Y)*W:M=0:Z=208
162 IFA=68THENF=O-(R>W)*W:M=-(R>W):Z=202
180 IFA<>A(O)ANDA<>A(Y)THEN200
190 TL=L+((D=T)-(D=MT)-(D=O)*T+(D=MO)*T)*((J=W)-(J=O))*((A=A(Y))-(A=A(O))):NL=W*
TL-L
191 N=PEEK(NL):IFPEEK(TL)<>PORN<>POR(PEEK(L+D)<>PANDPEEK(L+D)<>DO)THEN200
192 NL=NL+D:N=PEEK(NL):Q(J)=Q(J)-O*((A=A(Y))-(A=A(O))):ON(N=DO)+WGOTO201,215
200 NL=L+D:N=PEEK(NL):IFN=PTHEN215
201 IFN<>DOTHEN208
202 IFJ=0THENH=H+5-(R>3)*5:GOSUB1050:POKES1,250:GOTO215
203 IFG>60ANDRND(0)>.5ANDR>1THENN=218
204 GOTO215
208 IFN=218THENPOKES1,240:H=H+25:GOSUB1050:GOTO215
209 IFN=C(Y-J)THEN215
212 D(J)=((D=O)*T+(D=MT)-(D=MO)*T-(D=T))*((J=W)-(J=O)):D=D(J):C(J)=81-C(J):GOTO2
00
215 IFN=C(Y-J)THENGOSUB1200:GOTO150
216 POKEL,OL(J):OL(J)=N:L(J)=NL:POKEL(J),C(J):POKEL(J)+CV,CL(J):NEXTK:IFG<Z1THEN
152
230 POKEV,15:PRINT"▯BONUS":H=H+100:GOSUB1100:FORI=128TO255:POKES1,I:I=I:NEXT:R=R
+1
231 FORI=1TO99:POKES1,240:POKES1,220:NEXT:POKEV,0:GOTO120
1000 P1=(P-1)*2+1:PRINT"▥"LEFT$(A$,12-I)MID$(C$,P,1)MID$(D$,P1,4)LEFT$(B$,I-4)"
";
1005 IFI=4ORI=12THENPRINT"▮▩▩▩←←←";
1010 PRINTLEFT$(B$,I-4)MID$(C$,P+1,1);:IFI=12ANDP=3THENRETURN
1015 PRINTMID$(D$,P1,4);:IFI=12THENPRINT"▨";:RETURN
1020 PRINT"▮"LEFT$(A$,12-I):PRINT"▯"LEFT$(A$,12-I):PRINTTAB(14)"▯"SPC(I-3)LEFT$(
A$,12-I)"▮";:RETURN
1050 G=G+O:N=P
1100 PRINTL$"▩"SPC(10)"+,-":PRINTL$"▨"SPC(9)MID$(STR$(H),W):PRINTSPC(9)"("STR$(C
):RETURN
1200 POKEL(W),P:POKEL(O),AS:POKES3,Z:FORI=15TO0STEP-.1:POKEV,I:POKEL(O),AS
1220 POKEL(O),P:NEXT:POKEL(O),OL(O):POKEL(W),OL(W):POKES3,0:C=C-1:GOSUB1100:RETU
RN
1225 FORK=1TO13:READX:FORI=0TO7:READA:POKEX+I,A:NEXT:NEXT
1230 FORI=7552TO7631:POKEI,PEEK(I+25600):NEXT
1235 FORI=7176TO7383:POKEI,PEEK(I+25600):NEXT:RETURN
1260 DATA7488,90,90,90,24,24,90,90,90
1262 DATA7496,0,231,66,255,255,66,231,0
1264 DATA7408,8,8,8,8,8,8,8,8
1266 DATA7416,0,0,0,0,255,0,0,0
1268 DATA7448,0,0,0,0,15,8,8,8
1270 DATA7456,0,0,0,0,248,8,8,8
1272 DATA7472,8,8,8,8,248,0,0,0
1274 DATA7464,8,8,8,8,15,0,0,0
1276 DATA7520,238,170,174,172,234,0,0,0
1278 DATA7528,224,128,224,128,224,0,0,0
1282 DATA7512,238,136,232,40,238,0,0,0
1284 DATA7536,0,0,0,0,0,24,24,0
1286 DATA7424,0,0,0,0,0,0,0,0
1290 PRINT"▯▩":POKE36879,27:POKE36869,240

READY.
```

PET

Pet to Epson

Here is another program for dumping from a PET to an Epson printer. This version is for 80 column PETs.

To make effective use of the program, you will need any 80 column PET and an Epson MX printer capable of high resolution graphics.

The program performs basically two funtions:

1. To dump any screen window currently set on the PET to the Epson.
2. To list any program currently in memory on the Epson. All cursor characters and graphics within quotes will print exactly as they would on the screen.

When the program is loaded, the following POKEs and SYSs are effective:

POKE 117*256+9,X and/or POKE 117*256+6,Y where X and Y are:

X=0 , Y=76 normal compressed printing (default)

X=0 , Y=75 double width

X=1 , Y=76 double width (emphasised)

X=1 , Y=75 quadruple width

POKE 117*256+4,P alters the vertical pitch.

P represents the length of each feed in 72nds of an inch. P=8 will produce closed up lines as on the screen in upper case/graphics mode. P=12 will produce spaced out lines as in lower case/upper case mode. P=12 is the default setting. P can be any value in the range 1-85 inclusive, but if P is less than 8, lines will overlap.

SYS 117*256, NNN-MMM lists a program on the Epson.

Any program currently on the PET's memory will be listed from line NNN to line MMM on the Epson, just as it would be listed on the screen. If the NNN-MMM part is omitted, the whole program is listed. Printing will be at 80 characters per line maximum. Narrower printouts can be obtained by using POKE 213,n to alter right hand margin of the window.

SYS 118*256 dumps any screen window to the Epson.

If no window is set, the whole screen is dumped. (Locations 224, 225, 226 and 213 control the top, bottom left and right edges of the window.)

The program automatically detects which mode the screen is in and will print characters accordingly. However, if you want graphics printouts with the lines closed up, you will have to perform the POKE to alter the vertical pitch as described above.

The STOP key will abort any screen dump or listing. Unfortunately, the printer file is not closed, so it will need to be closed manually with:

```
CLOSE 255
```

The window may also need resetting by pressing HOME twice.

If you want a program that does all the above, you must first type it in. Normally, this would involve entering the monitor, listing a screenfull of memory, modifying it, doing a checksum calculation (if you're lucky enough to have checksum results provided), checking it and debugging it. With the "epson print" program, this would have to be done 15 times!

With the aid of the small basic program provided, you will be able to enter the machine code much faster than normal. Before you key in the basic program, type the following line in direct mode:

```
POKE55,0: POKE53,117: CLR
```

This will reserve a space for "epson print."

Now key in the basic program and save it as "quick mem load." You will be able to use this program to help you key in other machine code programs.

You are now ready to key in "epson print," but first here is an explanation of its unusual format:

The left hand column is the address (in hex) reached so far. The right hand column is a running check sum total. The large central block is the main program in a modified hex format. Each line consists of about 56 normal hex characters except that all the alphabetic characters have been modified to two characters:

A=.1 B=.2 C=.3 D=.4 E=.5 F=.6

Examples:

23 = 23 (no change)
2A = 2.1
B7 = .27
DF = .4.6

The reason for this modification is so that the whole program can be conveniently enetered using only the numeric keypad. With a little practice, you will be able to use the keypad without looking while you are reading each line. This results in a remarkable increase in speed when keying in machine code. You will find that when keying in ordinary machine code, it is surprisingly easy to mentally convert the alphabetic characters to their equivalents.

When you run the basic program, you will be asked for a start address. Type 7500 and press return. The screen will clear and you will be prompted for the data to start at $7500. Key in the first line of the program and press return. When the program has converted the line and entered it to memory, a checksum of all lines so far will be printed at the right hand edge of the screen and you will be prompted for the next line. The new address will be calculated for you. If the checksum for that line is not the same as the one printed, you have made a mistake in that line. Press the up-arrow key followed by return and the cursor will return to the previous line for editing. When you have finished keying in the first block (up to line $7717), press return alone to bomb-out of the basic program. Now, re-run the program and this time use 7800 from the start address.

When you have finished the second block, "epson dump" can be saved:

Enter the monitor with SYS 4 and type

.s"epson print,"08,7500,7800 to save on disk

or .s"epson print," 01;7500,7800 to save on tape.

The "epson print" program is now ready for use. In future, whenever you re-load the program, immediately key in the following line which will correct all basic's pointers: POKE52,0: POKE53,117: NEW

```
$7500  4.30.475800.31.24.3.1.1.1.1004.300.2.6207600.600920.65.2.5          1922
$7515  9004.39.1.2.40.5.620.66.2820.13.25207600.600.3.39.1.2.40            4709
$7529  .5020700020.66.28.40.486868.15110512.4006.19.6.685118512            7315
$7540  .190085.5085.52.194.685.45.191885.512051.50.191.22066.62           10254
$7556  .10018409.215.3.603.4.38.215.3.1.1.38.215.3.3512.4004.54           12889
$756A  11.6002.202.384462083.3.6.1920.1446297.62066.62.3922.40            15362
$7580  06.150949.6.68509.38.6011.215.3.4010.18.215.3.1.1.38.21            17946
$7594  5.3865.3855.4.40374.3.6.6.2310.4.1.39.6.6.60.46240930.42           20710
$75A8  .1.18446.10.208420.10.22841.6.10000.1.6010.3.1100.3.561.6          23000
$75BD  .4002.5620.211.610.6630.61.38.211.630.1.12066.624.3.3775           25625
$75D2  .15.4885.51.6006.15.36.4002.36.512000764.34075.1.1.1.1.1.1         28523
$75E7  .1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1           30903
$75F5  .1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.190085.41.19          33453
$7605  .6.685.4285.43.190485.442063.65.12.6.620.6.5.67.198085.5.5         36907
$761A  .190085.5.4.15.5085.5.6.15.5285.60.1200.54.5.6.60142032            39942
$762E  76.58.40.66.15.5.418695085.5.4.15.5.5690085.5.560.1.44.3           42951
$7642  .582902.600.2.197.385.62.190085.614.35.176.197885.62.19            45805
$7657  0085.61.191.22066.62.19412066.62.1.404752066.6220.51.6.6           48543
$766D  .14.45.21.5.4.3920.4007.34.52.60038810.6384.66.389838.55           51857
$7682  .528.40775.19008.408750.507752.508750.507752.508750.507            53422
$7699  752.50875.1.40975.60060.507752.50875.1200.2.405752066.62           55413
$76B0  .58.5004.40.65.1.50975.14.60.190085.64.21.5.4.10002.303            58197
$76C4  75.6004.10.6.6297.684.650.126.640.126.640.126.641865.61            60760
$76D9  85.63.15.6465.6285.64.1000.21.6345.652066.62.5000.600320           64034
$76EF  66.62.38.3008.40.5.4.56.60.14.60.34.66.60.2.390.2.1.14.52          67687
$7702  84.60.190.42066.62.190.12066.62.56.5.6203276.14.5.6.34.51          70665
$7717  .600.2900920.16.62.19.6.620.52.62604.36.176                        72829

          WHEN YOU REACH HERE, RE-START THE PROGRAM

$7800  00384492.1.19.17200003.5509090503.5000082.6.59292926.300            2210
$7818  003844828282440000082.6.5828244380000.6.592929282820000.6.5         4766
$7832  9090908080000003844829 2925.30000.6.510101010.6.500000000           6664
$784B  82.6.58200000004020282.6.3800000.6.510102844820000.6.502            8476
$7863  020202020000.6.540303040.6.50000.6.540201008.6.500003844            9968
$787B  828244380000.6.5909090906000003844828.1443.10000.6.59090           12338
$7894  98946200006492929292 4.30000008080.6.580800000.6.3020202           14520
$78AD  02.6.30000.5018060618.500000.6.504181804.6.50000.362810            16100
$78C4  1028.36000000.50101.510.500000868.19292.12.32000000.6.5            18038
$78DB  828282000000402010080402000000828282.6.50000000010207.6            19373
$78F5  20100000081.32.1080808080000000000000000000000000.620000           19773
$790F  000000.500000.5000000028.6.52828.6.5280000002454.6.55448           21419
$7927  000062640810264600006.392926.1040.100000000204080000000            22493
$7941  000038448200000000824438000000000005438.6.53854000000101 0         23567
$795C  7.31010000000000010600000000101010101010000000000006060000         23838
$7977  000002040810204000007.38.19292.127.30000002242.6.5020200           25162
$7990  00468.18.1929262000044829292926.3000008182848.6.5080000            27048
$79A9  .54.12.12.12948800003.3529292920.30000.30808.590.10.3000           29596
$79C0  006.3929292926.30000609292929294780000000000024000000000000        31234
$79DB  01260000000010386.3.36828200002828282828280000 8282.366.3          32717
$79F5  3810000040808.19090600008080808080808080800183.17.5.6.57.5         34155
$7A0E  3.118000000.6.60000000010101010101010102020202020202020            34876
$7A28  404040404040404000404040404040404040000.6.600000000000000000       35675
$7A43  0000.6.600000808080403000000000000000000.50100808080808 10.50      36481
$7A5D  000000.6.601010101010101018040201008040201010204081020408 0        37253
$7A78  .6.680808080808080808080808080808080.6.6003.37.57.57.57.53.3       40179
$7A8F  00020202020202020202020070.68.6.37.5.6.3.687000.6.600000000        41800
$7AA6  00000000000000304080881422418182442810 03.3424242423.30000         42717
$7AC1  103850.5.550381000000000000000.6.6000010387.3.6.57.3381008         44168
$7AD9  080808.6.6080808.1.155.1.15500000000000000000.6.600000000          45236
$7AF1  08101.5101.5102080.30.50.60.68.6.3.6.5.6.60000000000000000         47177
$7B07  00.6.6.6.6.6.6.6.6000000000.60.60.60.60.60.60.60.6808080           48701
```

```
$7B1B   808080808001010101010101.6.600000000000000.1.155.1.155          50114
$7B34   .1.155.1.155000000000000000.6.60.1050.1050.1050.105.6.6.6.5     51448
$7B4A   .6.3.68.60.50.308000000000000.6.6.6.600000000.6.6080808         53521
$7B60   000000000.60.60.60.600000000.68080808080808080.600000003        53903
$7B79   0303030303030300000000.60808080808080808.680808080808080808     54299
$7B94   0.60808080808080808.6.6000000.6.6.6.600000000000.6.6.6.6        55645
$7BAA   .6.600000000000000000000.6.6.6.6.6.6.30.30.30.30.30.30.30       58009
$7BBF   .30.50.50.50.50.50.50.50.50070707070707070707010101010101       60055
$7BD6   01.6.60.60.60.60.60000000000000000000.60.60.60.6008080808.68    61611
$7BED   000000.60.60.60.6000000000.60.60.60.600.60.60.60.6003844        63715
$7C03   92.1.19.1720000042.12.12.11.3020000.6.5142222221.300001.3      64891
$7C1A   2222222214000001.322222214.6.500001.32.12.12.12.118000010      65687
$7C32   107.590904000001825252519 3.50000.6.5102020201.500000000        66799
$7C4B   22.2.5020000000201012 1.2.5000000.6.50408142200000000082        67702
$7C64   .6.5020000003.520201.520201.5003.5102020201.500001.32222        68508
$7C7C   22221.300003.61824242418000018242424183.600003.510202020        69216
$7C96   100000122.12.12.12.12400002020.6.32222040000 3.302020204        69912
$7CAE   3.500003804020204380000 3.302021.302023.3002214080814220 0      70378
$7CC8   0038050505093.5000022262.12.13222000000.6.5828282000000         71404
$7CE1   40201008040200000082828 2.6.50000000010207.620100000081.3       72433
$7CFB   2.1080808080000000000000000000000.62000000000.500000           72973
$7D15   .5000000028.6.52828.6.5280000002454.6.5544800006264081 0        74617
$7D2D   264600006.392926.1040.1000000000204080000000000038448200        75723
$7D47   00000082443800000000005438.6.538540000001 0107.310100000        76699
$7D61   000001060000000010101010101000000000060600000000002040810       76844
$7D7D   204000007.38.19292.127.30000002242.6.502020000468.18.192        78630
$7D95   92620000448292929 26.3000008182848.6.5080000.54.12.12.12        80738
$7DAD   948800003.352929292 0.30000.30808.590.10.3000006.3929292        83118
$7DC5   926.30000609292929478000000000002400000000000000126000000      84249
$7DE0   0010386.3.368282000028282828282800008282.366.33810000040       85829
$7DFA   808.190906000080808080808080803.5509090503.5000082.6.5          87499
$7E13   9292926.30000384482828244000082.6.5828244380000.6.59292         89941
$7E2C   9282820000.6.5909090800000384482929 25.30000.6.5101010          92229
$7E45   10.6.50000000082.6.58200000000402028 2.6.3800000.6.5101028      93857
$7E5D   44820000.6.5020202020200 00.6.540303040.6.50000.6.5402010       95417
$7E75   08.6.500003844828244380000.6.590909090600000384482 8.144        97573
$7E8E   3.10000.6.59090989462000064929292924.30000008080.6.58080       100097
$7EA7   0000.6.302020202.6.30000.5018060618.500000.6.504181804.6.5     101681
$7EBF   0000.3628101028.36000000.50101.510.500000868.19292.12.32       103619
$7ED7   0008080808.6.6080808.1.155.1.155000000000000000.6.60000        104695
$7EEF   00.3.3.3.33333.3.3.3.3333399.3.3663399.3.36633000000000        106735
$7F05   000000.6.6.6.6.6.6.6.600000000 0.60.60.60.60.60.60.60.680      108003
$7F19   808080808080800101010101010101.6.60000000000000 0.1.155.1.1    109587
$7F33   55.1.155.1.155000000000000000.6.60.1050.1050.1050.1059933      110701
$7F4A   66.3.3993366.3.300000000000.6.6.6.600000000.6.608080800        112306
$7F61   0000000.60.60.60.600000000.68080808080808080.60000000303       112691
$7F7A   030303030300000000 0.60808080808080808.680808080808080808 0.6  113099
$7F95   08080808080808.6.6000000.6.6.6.600000000000.6.6.6.6.6.6        114685
$7FAB   000000000000000000000.6.6.6.6.6.6.30.30.30.30.30.30.30.30      116986
$7FC0   .50.50.50.50.50.50.50.50070707070707070703.50408102040         119020
$7FD7   800.60.60.60.6000000000000000000.60.60.60.6008080808.6800      120448
$7FEE   0000.60.60.60.600000000 0.60.60.60.600.60.60.60.6              122428
```

```
10 INPUT"START ADDRESS (HEX)";H$:GOSUB2000:PRINT"▒"
30 GOSUB1000:PRINT"$"H$" ";:INPUTL$
40 IFL$="↑"THENDD=LD:CK=LK:PRINT"▒▒"CHR$(22)TAB(8)LL$"▒":GOTO30
50 LD=DD:LK=CK:LL$=L$
60 L=LEN(L$):K=1
70 C=ASC(MID$(L$,K,1)):IFC=46THENK=K+1:C=ASC(MID$(L$,K,1))+9
80 K=K+1:B=ASC(MID$(L$,K,1)):IFB=46THENK=K+1:B=ASC(MID$(L$,K,1))+9
90 A=C*16+B-816:CK=CK+A:POKEDD,A:DD=DD+1:K=K+1:IFK<1THEN70
100 C$=STR$(CK):PRINT"▒"TAB(78-LEN(C$))C$
110 GOTO30
1000 H$="":D=DD
1010 FORW=1TO4:Z=INT(D/16)
1020 H$=MID$("0123456789ABCDEF",D-Z*16+1,1)+H$:D=Z:NEXT
1030 RETURN
2000 DD=0:FORW=1TOLEN(H$):C$=MID$(H$,W,1)
2010 DD=DD*16+ASC(C$)-48+7*(C$>"9"):NEXT
2020 RETURN
```

PET

Binary Key File search

This small program does a modified Binary Search on a Key Index File, and was valid records in ascending order and deleted records placed at random, the status of each deleted record being our old friend "π."

```
 1 DOPEN#7,"BINARYTEST",D1:DIMG(100):DIMX$(100)
 2 L=2:R=101:X=R:T=0:NN=0
 5 INPUT"KEY SOUGHT";S$
 10 G=INT((L+R)/2):PRINTG,L,R:GOSUB30:N=N+1:G(N)=G
 11 IFG(N)=G(N-1)ANDG(N)=RTHENGOTO200
 12 IFLL=2THENGOTO200
 15 IFG(N)=G(N-1)THENG=G-(T+1)
 20 GOTO70
 30 IFR<LTHENLL=2:GOTO60
 40 IFG=2THENLL=LL+1:GOTO60
 50 IFG>XTHENLL=2
 60 RETURN
 70 RECORD#7,(G):INPUT#7,X$:IFX$<>"π"THENNN=NN+1:X$(NN)=X$
 80 IFX$="π"THENGOTO120
 90 IFS$=X$THENGOTO220
 100 IFS$<X$(NN)THENR=G-(T+1):T=0:GOTO10
 110 IFS$>X$(NN)THENL=G+1:T=0:GOTO10
 120 G=G+1:T=T+1
 130 IFG>XTHENGOTO200
 140 GOTO70
 200 PRINTS$;"  ** NOT FOUND**":LL=0:GOTO2
 220 PRINTS$;" *** FOUND ***":LL=0:GOTO2
 225 REM ************************************************
 230 REM *
 235 REM * MODIFIED BINARY SEARCH BY J.RUBIN OCTOBER 82.
 240 REM * VARIABLES
 245 REM * S$....KEY SOUGHT
 250 REM * G.....RECORD NO. OF KEY
 255 REM * L.....INIT TO LOWEST VALID REC. NO. AT START OF SEARCH
 260 REM * R.....INIT TO HIGHEST VALID REC. NO. AT START OF SEARCH
 265 REM *
 270 REM * UPON RUNNING THE PROGRAM THE APPROPRIATE VALUES OF G,L AND R ARE
 275 REM * PRINTED AT EACH STAGE OF THE SEARCH
 280 REM *
 285 REM ************************************************
READY.
```

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```
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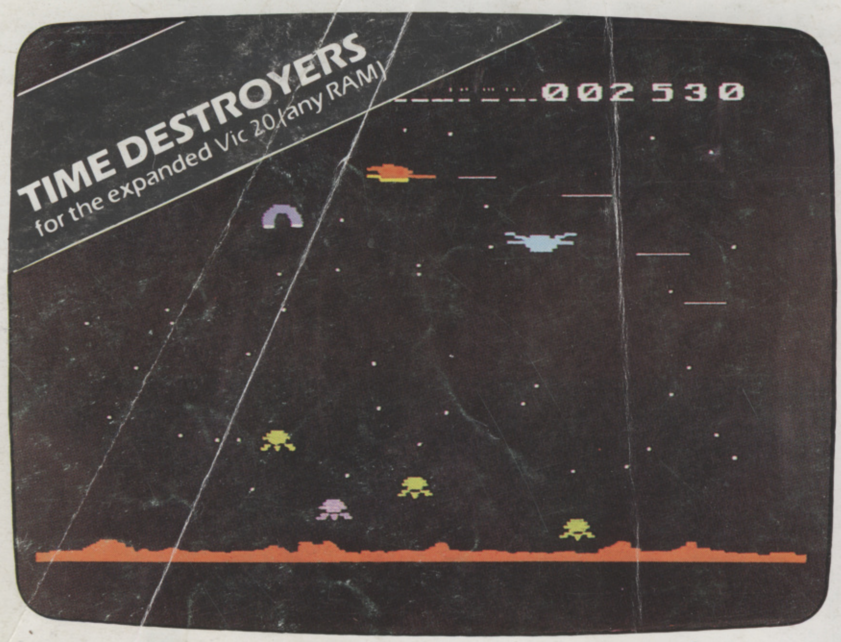

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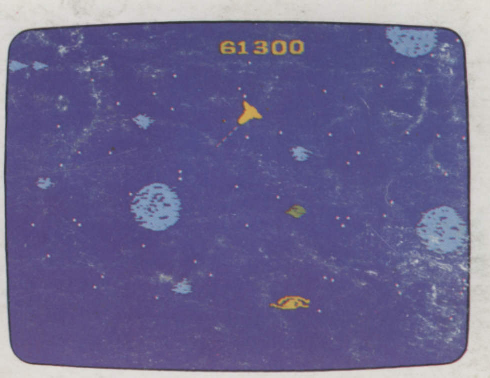

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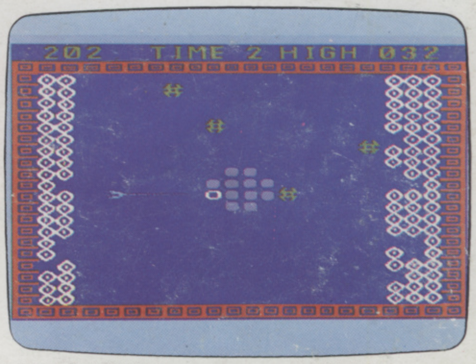

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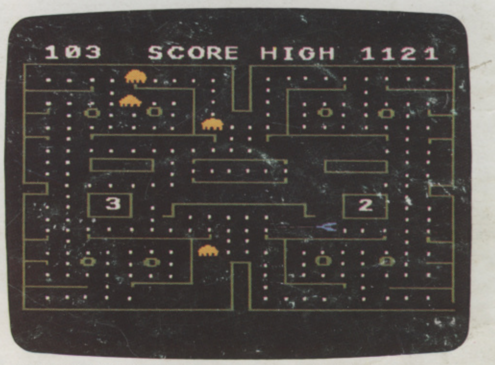

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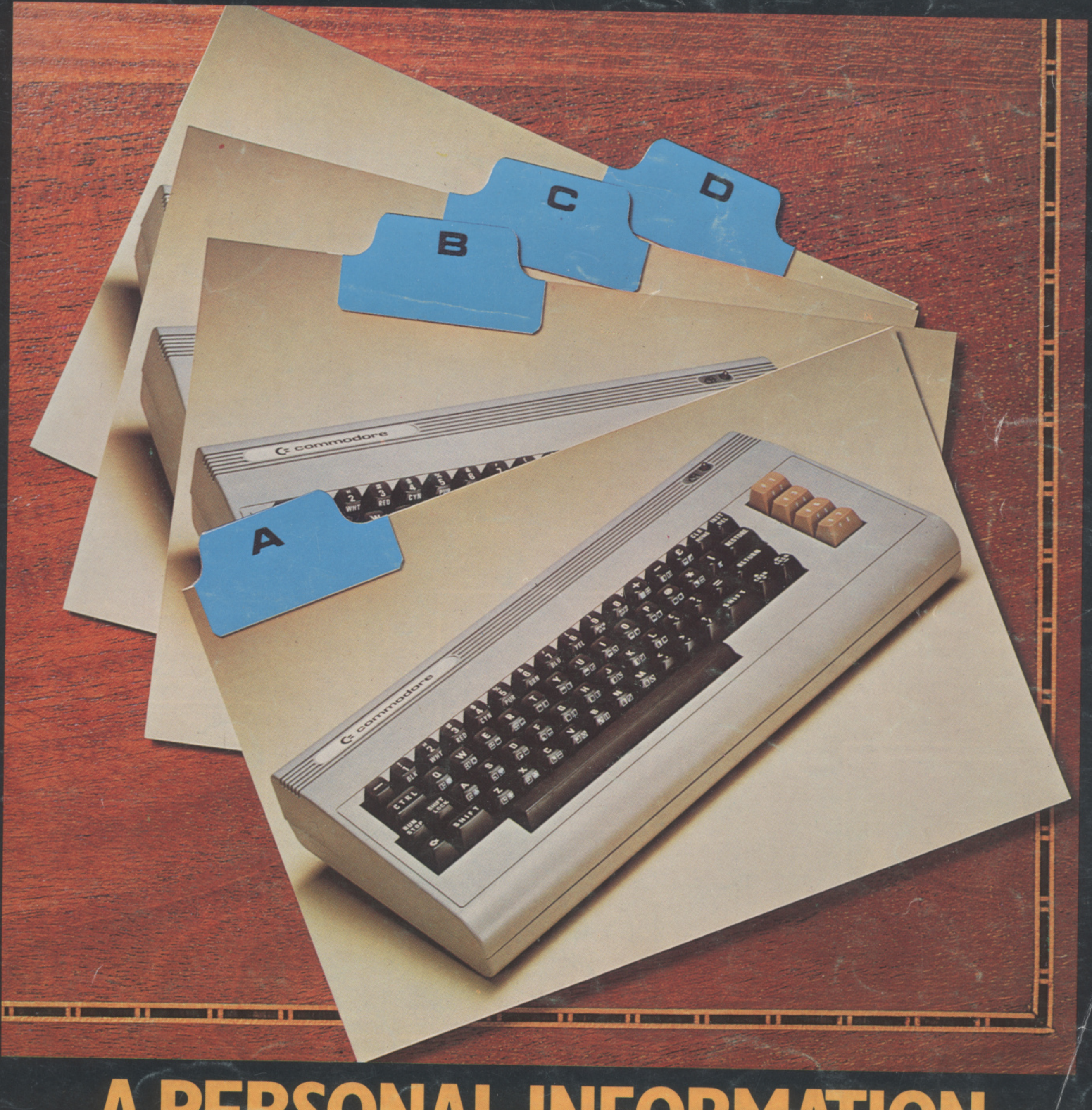

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